U.S. MARINE CORPS' SURFACE TACTICAL MOBILITY REQUIREMENTS FOR SHIP-TO-OBJECTIVE MANEUVER

A thesis presented to the Faculty of the U. S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

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During W.W.II a wide array of amphibious ships and landing craft provided a capability for U.S. power projection. More recently, a Soviet threat focus, the helicopter role in amphibious operations, and fiscal constraints are contributing reasons to slowed development of this capability. The need for amphibious operations has not changed. Protection of worldwide interests requires a capability to project power across a hostile shore. This thesis is an assessment that asks, "Do Marine Corps' surface tactical mobility requirements for ship to objective maneuver support the Naval operational concept of Operational Maneuver from the Sea (OMFTS)?". The concept of OMFTS discusses a renewed emphasis on amphibious capabilities, littoral warfare, and power projection. Both history and OMFTS emphasize the need for combined arms amphibious forces that make a seamless transition from seaward to landward maneuver. OMFTS professes that the mobility triad of AAAV, MV-22, and LCAC will meet ship to objective maneuver capabilities. This is a great start, but current and programmed capability does not adequately fulfill power projection needs. Surface ship to objective maneuver requires additional improvement.

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ABSTRACT

U.S. MARINE CORPS' SURFACE TACTICAL MOBILITY REQUIREMENTS FOR SHIP-TO-OBJECTIVE MANEUVER by Major Douglas M. King, USMC, 110 pages.

During World War II, a wide array of amphibious ships and landing craft provided a capability for U.S. power projection. More recently, a Soviet threat focus, the helicopter role in amphibious operations, and fiscal constraints are contributing reasons to slowed development of this capability. The need for amphibious operations has not changed. Protection of worldwide interests requires a capability to project power across a hostile shore. This thesis is an assessment that asks, "Do Marine Corps' surface tactical mobility requirements for ship-to-objective maneuver support the Naval operational concept of Operational Maneuver from the Sea (OMFTS)?". The concept of OMFTS provides a renewed emphasis on amphibious capabilities, littoral warfare, and power projection. Both history and OMFTS emphasize the need for combined arms amphibious forces that make a seamless transition from seaward to landward maneuver. OMFTS professes that the mobility triad of the Advanced Amphibious Assault Vehicle (AAAV), V-22 Osprey, tiltrotor helicopter replacement, and the Landing Craft Air Cushioned (LCAC) will meet ship-to-objective maneuver capabilities. This is a great start, but current and programmed capability does not adequately fulfill power projection needs. Surface ship-to-objective maneuver requires additional improvement.

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LIST OF ACRONYMS

AAAV	Advanced Amphibious Assault Vehicle
AAV	Amphibious Assault Vehicle
FBHL	Forced Beachead Line
HMMWV	High-Mobility Multipurpose Wheeled Vehicle
LAR	Light Armored Reconnaissance
LAV	Light Armored Vehicle
LCAC	Landing Craft Air Cushion
LCM	Landing Craft, Mechanized
LCU	Landing Craft, Utility
LVT	Landing Vehicle Tracked
MAA	Mission Area Analysis
MCCDC	Marine Corps Combat Development Command (MCCDC)
MEF	Marine Expeditionary Forces
MPF	Maritime Prepositioned Force
MPS	Maritime Prepositioned Shipping
MPSRON	Maritime Prepositioned Squadron
NEF	Naval Expeditionary Force
OMFTS	Operational Maneuver from the Sea
OTH	Over the Horizon
TOW	Tube-Launched, Optically-Tracked, Wire-Guided Antitank Missile
V-22	Osprey (tiltrotor helicopter replacement)

CHAPTER 1

THE EVOLUTION OF SHIP-TO-OBJECTIVE MANEUVER

Introduction

Amphibious warfare has evolved from the use of wooden boats to complex systems involving landing craft, aviation, causeways, and amphibious vehicles. The ship-to-shore movement phase, a critical and dangerous part of the amphibious operation, has become even more dangerous with the increased lethality and situational awareness of the modern battlefield. The Naval Service has responded to these dangers by formulating a new concept for power projection, "Operational Maneuver from the Sea" (OMFTS).[1]

The successful application of OMFTS is critical to the Marine Corps' and the nation's ability to respond to worldwide crisis with a credible response.[2] Inherent in OMFTS is the ability to maneuver combined arms forces from a seabase to inland objectives in one stroke. OMFTS applies the concepts of maneuver warfare to amphibious operations, whereby ship-to-shore movement now becomes ship-to-objective maneuver.[3] This single change in concept significantly alters the tactical mobility requirements of the United States Marine Corps.

Statement of the Problem

Does the Marine Corps' surface tactical mobility requirement for ship-to-objective maneuver support the Naval operational concept of OMFTS? This study assesses the surface tactical mobility capabilities

needed for ship-to-objective maneuver. The study goals are an assessment of the development of ship-to-objective surface tactical mobility, current capability, deficiencies relative to OMFTS, planned enhancements to current capability, and recommendations for improvements.

Subproblems

The First Subproblem. How was maneuver from the sea conducted in the past? Analyzing past amphibious operations provided insights into linkages between ship-to-shore movement capability and the ability to transition to land warfare.

The Second Subproblem. What factors contributed to the development of OMFTS? The worldwide instabilities and protection of national interest demand a power projection capability.[4] One method to project power is through the amphibious assault. The concept of OMFTS is well-defined and provides a compelling argument for improved capability.

The Third Subproblem. What are the current surface tactical mobility assets involved in OMFTS? Do they support the concept of OMFTS? Current notional amphibious operations, as studied at the Marine Corps' Amphibious Warfare School, and available notional amphibious lift capability and surface tactical mobility assets provide the means to describe current capability and the ability to support the concept of OMFTS.

The Fourth Subproblem. What are the planned surface tactical mobility assets supporting OMFTS? Do they meet the requirements for

seamless maneuver from ship-to-objective as described in OMFTS? Assessing the Marine Corps' planned acquisitions and analysis conducted on the Advanced Amphibious Assault Vehicle (AAAV) and V-22 Osprey (V-22) tiltrotor helicopter replacement provided insights to planned future capabilities.[5]

The Fifth Subproblem. What additional capabilities are needed to support OMFTS? The comparison of historical needs, current and planned capabilities, and capabilities described in the concept of OMFTS provide a basis for assessing required additional capability.

Background

Role of the Marine Corps in the National Defense

Establishing the role and mission of the Marine Corps is necessary to understand the unique capabilities described in the Naval concept of OMFTS. The role of the Marine Corps is succinctly described in Fleet Marine Force Manual 1-2, The Role of the Marine Corps in the National Defense,

> Despite evolutionary change and adaptation to the strategic environment, that role has remained constant on three counts: association with the fleet to meet the Nation's needs for power projection of force in peace or war; readiness for expeditionary service; and reliable performance. [6]

Throughout the history of this Nation, the Marine Corps has conducted expeditionary amphibious operations. The Marine Corps Hymn proclaims the essence of this Corps of Marines. "From the Halls of Montezuma to the shores of Tripoli, we will fight our countries battles in the air, on land, and sea . . ." is a plain statement of the Marine Corps' expeditionary nature. As articulated in Title 10,

> The Marine Corps, within the Department of the Navy, shall be so organized as to include not less than three combat divisions and three air wings, and other land combat, aviation, and other services as may be organic therein. The Marine Corps shall be organized, trained, and equipped to provide fleet marine forces of combined arms, together with supporting air components for service with the fleet in the seizure or defense of advanced naval bases and for the conduct of such land operations as may be essential to the prosecution of a naval campaign.[7]

The Congressional Conference report of the 82d Congress supporting the Title 10 final legislation further described the nature of the Marine Corps as

> Such a force, versatile, fast-moving, and hard hitting, will constantly have a very powerful impact in relation to minor international disturbances. Such a force can prevent the growth of potentially large conflagrations by prompt and vigorous action during their incipient stages . . . to provide a balanced force in readiness for a naval campaign and at the same time, a ground and air striking force ready to suppress or contain international disturbances short of large scale war.[8]

Title 10 further tasks the Marine Corps with the development of tactics, techniques, and equipment for prosecution of amphibious operations.

The Need for Amphibious Assaults

Simply put, the Marine Corps is a force in readiness, immediately available in many ways to support the United States' interests abroad. The Marine Corps, in conjunction with the other services and other instruments of national power, through force or the threat of force, ensures protection of this nation's interests. Recent focus on crisis response, peacekeeping, and humanitarian assistance emphasize the need for the United States to project power. Whether requested by a nation in distress or as an invading force, the United States requires power projection capabilities to protect its interests. When a friendly nation requests United States' assistance, generally

airfields and ports are available near the area of operations. All of the military services function well under this condition. Another situation may arise when a nation requests assistance but, either its infrastructure will not support or limits the capability to introduce shipping or aircraft. Additionally, the United States, although not invited into a foreign country, may determine it is in the national interest to introduce military forces without invitation. Both this situation and the previous one require an expeditionary capability not reliant on any infrastructure. Finally, further complicating the introduction of forces is the degree of opposition. Forcible entry capabilities facilitate power projection when either opposed or unopposed. The nation's forcible entry capabilities as described in Fleet Marine Force Manual 1-2, The Role of the Marine Corps in the National Defense, are either amphibious or airborne forces.[9]

Defining the Amphibious Environment

A clear understanding of the amphibious environment is necessary to evaluate the required tactical mobility capabilities supporting ship-to-objective maneuver. The amphibious operation takes place in the littorals. The Naval Services interpret littorals as an area adjacent to the sea and extending up to 300 miles inland.

> While representing a relatively small portion of the world's surface, littorals provide homes to over three-quarters of the world's population, locations for over eighty percent of the world's capital cities, and nearly all of the marketplaces for international trade. Because of this, the littorals are also the place where most of the world's more important conflicts are likely to occur. Moreover, ninety-nine percent of U.S. exports by weight travel on the seas, with many of the important choke points controlled by states in crisis. Outside of the industrialized democracies, many national infrastructures are in decay and ruin. Few airfields in

> the Third World can receive America's strategic aircraft; many port facilities are unable to handle the larger sealift ships; and roads and railroads are poorly managed or non-existent.[10]

To influence events overseas the United States requires a credible, forward deployable, power projection force capable of overcoming a devastated infrastructure to assist a friendly nation in need of disaster relief or countering the entire spectrum of armed threats. In the absence of adjacent land bases, a sustainable forcible entry capability that is independent of forward staging bases, friendly borders, overflight rights, and other politically dependent support can come only from the sea.

Defining Amphibious Assaults

Historically, amphibious operations have been linear operations. Execution of these operations occurred in distinct phases: maneuver in ships to a suitable beach; ship-to-shore movement; phased buildup of combat power ashore and establishing the beachhead; and, finally, subsequent inland maneuver. Initially, inland maneuver was generally limited to fifty miles inland from the beach. Operations were tied to the support range of ships, their landing craft, combat support capability, and combat service support buildup. Attrition warfare guided the conduct of these operations; the landing force sailed to where it could land, pushed as much combat power ashore as possible, and then overpowered the opposition. When the opposition had equal combat power to the amphibious forces a bloodbath resulted.

Increases in the capability of modern weapons, situational awareness, and a proliferation of high-technology lethal weapons systems

made the traditional amphibious assault on an opposed beach a costly alternative. Nonetheless, the nation requires this capability to rapidly introduce combat power from the sea into immature theaters or across a defended or benign beach.

The answer to this challenge is the Naval concept of OMFTS. Simply put, OMFTS is the applications of maneuver warfare as described in Fleet Marine Force Manual 1, Warfighting, to amphibious operations. "Maneuver warfare is a warfighting philosophy that seeks to shatter the enemy's cohesion through a series of rapid, violent, and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy can not cope."[11] The aim of maneuver warfare is to desynchronize the enemy's combat power and shatter his moral and physical cohesion rather than destroying him incrementally through attrition.

Defining OMFTS.

OMFTS conceptually changes amphibious operations and subsequent operations ashore by including the sea as a mobility corridor. OMFTS describes the amphibious assault as a seamless maneuver by forces operating from a seabase to an inland objective. Maneuvering forces gain flexibility by unimpeded maneuver through the sea to littoral penetration areas of their choosing. Additionally, with increased tactical mobility and range, assault forces can subsequently maneuver from positions ashore through the sea to subsequent inland objectives, while being supported from a seabase. OMFTS fully exploits the sea as a mobility corridor. Moreover, OMFTS takes advantage of United States'

naval dominance by sustaining and supporting the inland maneuver from a well-protected seabase. The traditional beachhead is no longer required or relevant. The following excerpt from the concept describes this fundamental change.

> OMFTS: A Path to the Future . . . the sea offers, as it always has, strategic, operational, and tactical mobility to those who control it. However, for most of the twentieth century, requirements to transition to war on land severely constrained options created by control of the sea. In 1944, for example, Anglo-American control of the seas was sufficient to permit landings anywhere along the extensive Atlantic coast of France. The requirements to ferry a massive, relatively immobile force ashore, and then provide the support necessary to create maneuverability within that force, restricted the choice of landing areas to those large beaches and open drop zones supportable from Great Britain. Thus, the landings could only take place on selected portions of the northwest coast of France.
>
> By way of contrast, a naval expeditionary force of the near future will be able to make full use of the options provided by control of the sea. A naval expeditionary force attacking from Spain, for example, would have the ability to fight a campaign on the western side of the Atlantic without having to establish a base at some intermediate point. This ability to operate at long distance, moreover, would give a force trained and equipped for future Operational Maneuver from the Sea the freedom to land powerful forces through nearly any point along the east coast of the North American continent, as described in Figure 1.[12]

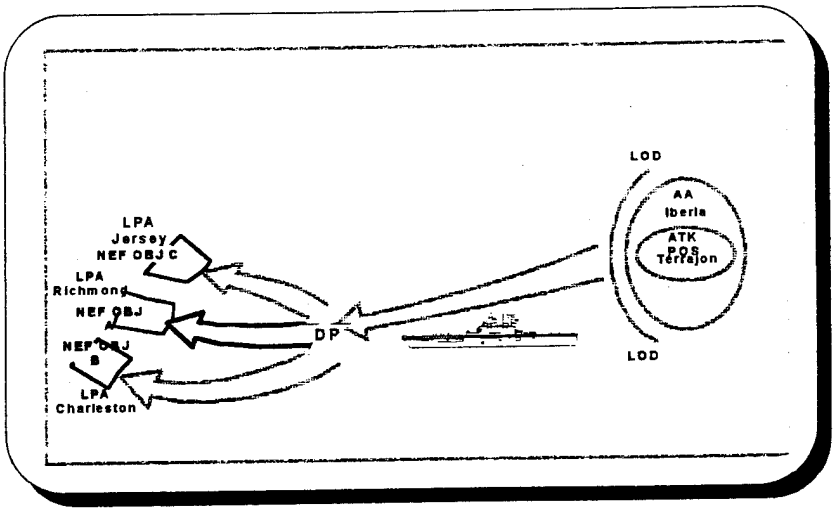

Figure 1. Illustration of OMFTS.

These changes are not exceptional, they simply link maneuver at sea, maneuver from the sea, and landward maneuver into operational maneuver.

> In a more detailed representation, Figure 2, the attack on Richmond (NEF Objective A) relentlessly continues as advance operations and real time reconnaissance identifies highly exploitable Littoral Penetration Points (LPP) through which the attacking forces swarm by air and surface means to overwhelm enemy defenses. The attack progresses from ship-to-objective with no large or lengthy buildup on the initial beaches. (In many cases, in fact, the assaulting Marines will simply pass through the penetration points, leaving no residual forces at all.) A maritime prepositioned force (MPF) landing reinforces this attack, while other Marines are the seaward flank for an overland southern advance of combined Army, Air Force, and allied forces.[13]

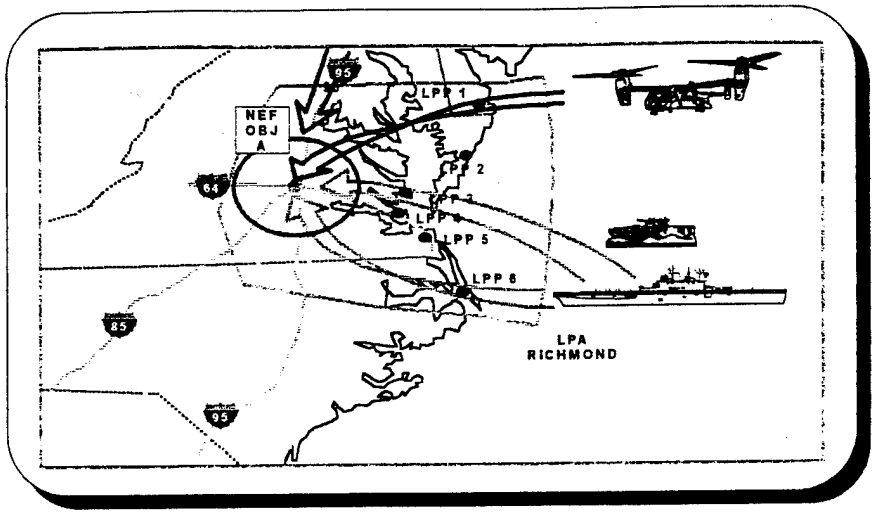

Figure 2. Detailed illustration of OMFTS.

Amphibious operations is commonly thought of as an assault against a defended beachhead. OMFTS breaks this thought process by exploiting the mobility advantages offered through operations from and through the sea. Through seaward and landward maneuver, the enemy is placed at a disadvantage. Another aspect not

routinely considered in amphibious operations is an operation short of war. The Marine Corps has routinely responded to various forms of worldwide crisis throughout its history. These operations include a show of force, a non-combatant evacuation, a humanitarian assistance, peacekeeping, and peace enforcement. OMFTS requires changes to the conduct of these operations as well.

> Maneuver Welfare. Though their definitive task is always to prepare for and fight the nation's wars, deployed naval forces are often called upon to do such things as evacuate non-combatants, assist disaster victims, and protect the delivery of relief supplies. Like today's Navy-Marine team, the naval expeditionary forces of the future will not be designed specifically for such tasks. Nonetheless, future naval expeditionary forces will, thanks to the equipment and training associated with Operational Maneuver from the Sea, have a significantly enhanced ability to conduct operations other than war.
>
> Sea basing will free Marines from the need to set up facilities ashore prior to devoting their full energies to relief efforts. Improvements in ship-to-objective mobility will allow help to be delivered directly to areas where it is needed most to include places far from ports and airfields. The highly accurate and rapidly responsive weapons on board the ships of the naval expeditionary force--weapons that can be quickly employed to support Marines on the ground--will allow a landing party to present a less threatening appearance while not depriving it of powerful means of protection.[14]

The value of these capabilities can be seen by comparing what happened in the 1992 relief effort in Somalia with what could have been accomplished by a naval expeditionary force trained and equipped for OMFTS. In the historical case, the Marine Air Ground Task Force (MAGTF) could not proceed inland to its objective until it had established a lodgment to support and sustain the advance of convoys and limited range helicopters.

> For the next generation of naval power projection forces, the 240 kilometers that separate Baidoa from Mogadishu and the shoreline would be much less of an obstacle. Indeed, the landing of

> a force in Mogadishu (ship to coastal objective) and a detachment at Baidoa (ship to inland objective) could be carried out simultaneously, speeding relief to those in need and depriving potentially hostile forces of the ability to prepare and effectively react.[15]

Development for OMFTS

This study examines relationships between the maneuver forces, combat support forces, and combat service support forces and their capability to maneuver from and through the sea to an objective via surface tactical mobility. OMFTS infers that rapidly maneuvering lighter forces will be able to rely on long range fires and logistics projected solely from a seabase. Throughout history there has always been a need for support of the close fight. Desert Storm is a prime example of the relationship between close fires and high-technology precision fires. Although the air campaign did much to destroy Iraqi morale and command and control capabilities, it took close fire and maneuver to finally accomplish the strategic and operational objectives.

Full development of all Battlefield Operating Systems (BOSs) is required to realize the full potential of OMFTS. These developments include a command and control and intelligence network that is available at all levels of command to ensure rapid decision making. Additionally, multi-mission capable aircraft that operate from a variety of ships and austere bases ashore are required to provide the expeditionary force with immediate support. Mines provide the capability to infringe upon seaward mobility; therefore, covert reconnaissance and mine clearing, amphibious maneuverability, and in-stride breaching capabilities are necessary. With the retirement of U.S. Navy battleships, fire support

beyond aviation and limited naval surface fire support is also necessary to support maneuvering forces.

The ability to maneuver comes from synchronized development and employment of all of the BOSs to include combat service support. Combat service support relies on both air and surface tactical mobility. Improvements in command and control, responsiveness, packaging, and delivery are critical to combat service support of the future. Moreover, delivery of combat service support has a direct relationship to maneuver capabilities. Sustaining maneuvering forces requires surface lift. However, the surface lift assets used are the same assets supporting the maneuver forces.

Ground maneuver forces are supported by both air and surface lift, including landing craft, amphibious assault vehicles, and helicopters. Both history and OMFTS emphasize the need for combined arms amphibious forces that make a seamless transition from seaward to landward maneuver in combat formation with all required sustainment and support. Moreover, full exploitation of OMFTS requires an ability for these forces to transition from sea to land maneuver and rapidly back to maneuver through the sea.

Defining Surface Tactical Mobility

Surface tactical mobility includes both landing craft and amphibious vehicles. Amphibious shipping, with embarked landing craft, sail to the amphibious objective area. In the objective area, landing craft with embarked vehicles, equipment, personnel, and cargo maneuver to the shore. Amphibious vehicles, embarked aboard amphibious shipping

and transported to the amphibious objective area, self-deploy through the surf to the shore and continue to maneuver to inland objectives. The Amphibious Assault Vehicle (AAV) family of vehicles used by the Marine Corps are the only surf capable vehicles in the world.[16]

OMFTS is reliant on not only a change in mindset but technological improvements to realize its full potential. OMFTS addresses the mobility triad including the V-22, AAAV, and the Landing Craft Air Cushion (LCAC) as the basis for ship-to-objective maneuver. This mobility triad supports the ship-to-objective maneuver for assault elements of the Marine Corps. The LCAC and aviation provide the lift for combat support, combat service support, and the heavier assets of the assault elements.

Current planning is for the V-22 to provide tactical mobility for air assault forces and air transportable combat service support. AAAV will provide tactical mobility for ground maneuver infantry forces. The LCAC will provide tactical mobility for the MAGTF's heavier assets that cannot fit aboard the V-22 or AAAV. These assets include Light Armored Vehicles (LAVs) for reconnaissance and security, tanks, artillery, heavy weapons mounted in the armored High-Mobility Multipurpose Wheeled Vehicle (HMMWV), and combat service support. Critical to maneuvering combined arms forces seamlessly from sea to objective is both AAAV and LCAC availability.[17]

Scope

The goal of this study is to assess whether planned Marine Corps' tactical mobility improvements adequately meet the goals

expressed in the concept of OMFTS. The assessment will include all surface assets for ship-to-objective maneuver. These assets include amphibious assault vehicles and landing craft.

Limitations

The following limitations restricted development of the thesis and research.

There is no previous analysis of the problem. Key to this study is a historical assessment of past capability.

The study location restricts the availability of Marine Corps' expertise and data. The study uses the results of correspondence interviews with key Marine Corps officials, interviews of Marine Corps students attending the Army Command and General Staff College, and related studies.

The Marine Corps' plan for the future appears to be reliant on AAAV, V-22, and LCAC. This assessment is based on subjective judgments of historical reports, current viewpoints, and the Marine Corps' modernization plans.

Delimitations

This study is limited to the assessment of only surface tactical mobility for ship-to-objective maneuver.

A notional assault element provides the basis for an assessment of current and future capability. The assault element was a combined arms force with appropriate assets to operate across the spectrum of contingencies.

Countermine and breaching assets are not assessed.

Command and control, fires, logistics, and aviation are all relevant aspects of OMFTS, but would enlarge this study beyond a manageable scope.

Amphibious shipping will remain a constant in conjunction with the Naval Service's long term Amphibious Lift Enhancement Plan.

Funding was not addressed. This is a conceptual assessment designed to provide a desired endstate, not to determine a specific solution.

Assumptions

The first assumption is that the Marine Corps' role in the national defense will not substantially change. The United States will continue to require the Marine Corps to provide an expeditionary crisis response capability.

Second, future power projection capabilities require amphibious operations. Declining port facilities, infrastructures and limitations of airlift will require a capability to project a combined arms force across a friendly or hostile shore.

Third, the Naval Services will continue to develop the capabilities required to support OMFTS. The current realization by the Naval Service that the ability to respond to threats in the littoral regions is its most important contribution to this Nation continues and supports full development of capabilities across the BOSs to dominate these regions of the world.

Fourth, technology of the next twenty-five years will not eliminate the need to support maneuver with close fires and limited immediate logistics.

Fifth, the Marine Corps will continue procurement of the AAAV and V-22. Current funding will remain and planned funding outside of the Naval program will take place.

Sixth, discussions of ship-to-objective maneuver will include the helicopter to lend clarity. However, the assumption is that the CH-53E helicopter along with the procurement of the V-22 will support the needs for vertical maneuver from the sea. However, these assets will not fully support maneuver of heavy combat, combat support, or combat service support forces.

Conclusion

Several factors account for the development of the OMFTS concept and the need for development of enhanced capabilities for ship-to-objective maneuver. First, the United States' requires the means to project combat power in defense of its national interests. Lieutenant General (retired) Victor Krulak stated in late 1995, "The need for amphibious operations has not changed."[18] Second, what has changed are battlefield conditions and technology. The Commandant of the Marine Corps General Charles Krulak identified a shift from global to regional threats; the proliferation of mines, cruise missiles, and tactical ballistic missiles; and a requirement to project power without overflight or basing rights as catalysts for the change to OMFTS.[19] Third, the principles of maneuver warfare drive changes in the doctrine

for amphibious operations. Lieutenant General Van Ryper, Commanding General of the Marine Corps' Combat Development Command, cites the adoption of maneuver warfare concepts as a contributing factor in the development of OMFTS.[20] Finally, the U.S. Navy's domination of the sea, importance of the littoral regions, and advancing technology facilitate and require the use of the sea for maneuver. These factors are brought out in the concept for OMFTS and were highlighted as contributing factors for change by Lieutenant General Anthony Zinni, Commanding General of I Marine Expeditionary Force.[21]

Fully developing the capabilities described in OMFTS is an evolutionary process that will progress with technology, worldwide threats to security, and fiscal climates. It is recognized that the concept provides a thought process and is not restricted by equipment. However, specific equipment development increases the ability to maximize potential capability as outlined by OMFTS principles and goals. This study will concentrate on surface tactical mobility for ship-to-objective maneuver. However, it is difficult to assess these capabilities without including some discussion of the helicopter. Helicopters have and will continue to be a critical portion of tactical ship-to-objective maneuver capabilities.[22] Additionally, fulfillment of the goals of OMFTS will require development across all battlefield operating systems.

CHAPTER 2

CONDUCT OF THE STUDY

Literature Review

The literature search and review provided valuable insights to the author in developing the thesis. Although specific assessments in the area of surface tactical mobility for ship-to-objective maneuver are not available, a wealth of information is contained in after-action reports, periodicals, theses, and selected books discussing the subject.

Researching how maneuver from the sea was conducted in the past provides a basis for assessing future needs. Considerable information discussing how assaults were conducted and how surface tactical mobility contributed to the success of the mission is available. The assessment of snapshots in time, such as Caesar's assault into Britain, Gallipoli, Tarawa, Vietnam, and the Falklands, provide a basis for historical research. These operations represent different technological timeframes, as well as varied threats, and will provide insight into what benefits and limitations resulted from ship-to-shore maneuver capabilities.

Also resources describing the development of landing craft (surface tactical mobility), were found in previous studies, periodicals, and historical literary works. Assessing the role these assets played in maneuver of forces to achieve the necessary combat power for mission accomplishment is essential to the thesis. Moreover,

understanding why certain assets were developed in the past builds a foundation for current and future developments for OMFTS. Developmental work done during the 1930s and 1940s on amphibious assault capabilities at the Marine Corps Combat Development Command in Quantico, Virginia, will assist in developing the thesis conclusions.

Another interesting aspect discovered during the literature search was the role and development of Soviet naval infantry. Soviet Naval Infantry is rarely discussed; however, the literature search provided insights into developmental priorities and capability. This research adds an interesting source of comparison to the study.

Current Marine Corps assessments, interviews of Marine officers attending the U.S. Army Command and General Staff College at Fort Leavenworth, Kansas, and a review of present training and notional planning scenarios for amphibious operations are the basis for the assessment of current capability. The Naval concept of OMFTS is relatively new and has been the subject of considerable discussion and scrutiny by both students at advanced and intermediate schools and in military journals. Sufficient information exists to describe the development of OMFTS, the need for amphibious operations, the need for maneuver/logistics over the shore, and how to conduct these operations in the future.

Future capability assessment relies on analysis conducted on planned Marine Corps acquisitions. Recent studies conducted by the Marine Corps Combat Development Command to determine how well AAAV and MV-22 support the concept of OMFTS, Marine Corps modernization plans, and fiscal programming will support final conclusions.

The Cost and Effectiveness Analysis of the AAAV and V-22 included the LCAC in evaluating capability for ship-to-objective maneuver. This analysis will be augmented by interviewing key Marine Corps officials through written correspondence. Moreover, the interviews conducted with Marines attending and supporting the Command and General Staff College at Fort Leavenworth will add information. The information gained from the completed analyses and interviews will be assessed and included in chapters pertaining to the present and future capability. The written interview is included as an appendix to the study.

Methodology

My research will initially focus on the historical development of ship-to-shore movement and subsequent maneuver from the beach inland. I will look at how capabilities for surface tactical mobility limited the battlefield. After the historical review, conclusions on capabilities required for ship-to-shore movement and subsequent inland maneuver will be developed.

After gaining an understanding of the surface tactical mobility requirements in general, the thesis research will focus on why the change was made to OMFTS. The result of this research should be an understanding of the impact on existing capabilities and refined requirements for the future. Then projected surface tactical mobility capabilities will be evaluated to identify if planned capabilities to support OMFTS are sufficient.

An assessment of past ship-to-shore and objective maneuver capabilities provides a basis of future needs. Most often amphibious operations invoke thoughts of Marines storming WW II Pacific island beaches. However, amphibious operations have been an integral part of warfare. For example, ancient Athens, a maritime power, continually exercised sea-based power to protect its vital interests ashore and at sea. The Peloponnesian War period is a classic example of using the sea for maneuver to effect inland objectives. This study will begin with history to gain an understanding of ship-to-objective maneuver.

CHAPTER 3

HISTORICAL ASSESSMENT OF CAPABILITY

Introduction

Throughout history many nations have incorporated amphibious warfare in support of strategic interests. Projecting power and influence for a maritime nation such as the United States requires deploying across a foreign shore. Capabilities for such power projection have developed through time relative to technology and warfighting needs. However, during the greatest portion of recorded history, amphibious capabilities remained remarkably similar.

Capabilities required for successful execution of amphibious operations are no different from warfare conducted on land. In many cases, the requirements for amphibious operations or power projection have been the genesis of overall military development. The most publicized amphibious operations emphasize shock, firepower, and deliberate movement across the beach, while some of the most successful operations have emphasized maneuver. Regardless, the ingredients for success are sea and land maneuverability, combined arms, survivability, and a rapid transition to land combat. The fact that every major offensive launched by the United States during WW II started with an amphibious assault has led many to believe amphibious operations are a recent development.[1]

Early Amphibious Operations

One of the first commanders to realize that amphibious warfare had specific requirements was Julius Caesar. Caesar's amphibious invasions of Britain in 55 and 54 B.C. provide a lesson in ship-to-shore mobility. Caesar assembled his forces for the invasion and embarked them aboard merchant ships. These ships lacked maneuverability in tight spaces and had deep drafts that did not allow them to get close to the shore. Moreover, the ships lacked the ability to discharge personnel or equipment efficiently. As a result, Caesar's heavily armored troops floundered in the deep water while the Britain cavalry assaulted.

The Roman's were unable to assault in their regular formations and failed to move inland. Caesar's own cavalry remained at sea, embarked in ships unable to reach the coast. Caesar's only saving grace was that his shock troops and some of his catapults were on shallow draft ships that could sail directly onto the beach. These forces were able to force a landing and save the remainder of the Roman army. Eventually, Caesar's infantry established a beachhead. However, his cavalry, heavy weapons, and sustainment could not land. Without cavalry, heavy war machines, and supplies, Caesar could not transition to attack inland objectives. Caesar withdrew back across the channel and spent the winter evaluating lessons learned and preparing for another assault.

Caesar's second amphibious assault of Britain is a military classic that embodies the principles of OMFTS. Over the winter Caesar capitalized on his mistakes and built an amphibious fleet of some 800 vessels. Each of these had a shallow draft and a low freeboard to allow

disembarking. This amphibious warfare fleet permitted troops, cavalry, supplies, and heavy war machines to move together and discharge on or near the beach. The army maintained unit integrity, landed in fighting formations, and transitioned smoothly to land warfare. These capabilities facilitated a seamless maneuver from the sea inland with a combined arms force in combat formation. Moreover, Caesar capitalized on the inherent mobility of the sea. Caesar's rapid maneuver ashore across several littorals completely surprised and overwhelmed the Britains.

Caesar recorded his amphibious lessons from the Britain campaigns and provided a great contribution to amphibious warfare.[2] The lessons of 54 B.C. are a doctrinal and equipment baseline for current and future capability. Specifically, they describe a recognizable need for special equipment and combined arms in the assault from the sea.

During the Middle Ages, innovative development of ship-to-shore mobility occurred again. The Crusaders developed a forerunner to modern landing craft. Armored knights were required immediately during power projection operations on the Saracen coast. The knights embarked in Venice, and during movement to the objective area, they mounted horses tethered in the center of the ship. Upon arrival in the littoral the ships were beached and the ship's forward ramp dropped, allowing the knights to attack directly from the ship. Additionally, the knights were supported by rockets and fires hurled from ships and mobile systems moving across the beach. This early glimpse of amphibious innovations again demonstrates an early requirement for moving rapidly from the sea as a combined arms force.[3]

History records many amphibious operations with various outcomes. Throughout history, improving lethality was the focus of warfighting development. Tactical mobility, on the other hand, to include tactical mobility allowing maneuver from the sea, changed very little. Before the technology revolution of the late 1800s there was no reason to improve ship-to-shore movement capability. Most often wars were continental struggles. The industrial age reopened the world to force projection operations. Technology innovations in weaponry challenged abilities to project power, while innovations in ship design and propulsion began changing naval forces. As the twentieth century opened, nations were trying to harness technology and develop ways to project power and overcome increased weapons lethality.

Gallipoli

In the opinion of some, amphibious operations entered the twentieth century stillborn. The Battle of Gallipoli provides an early glimpse of how firearms and shipping would alter amphibious development. The startling developments of small bore magazine fed rifles, quick firing cannons, and machine guns made successful completion of an amphibious assault doubtful. This was the popular opinion when British troops assaulted at Gallipoli.[4] Until Gallipoli, the amphibious assault had little test against modern weapons. Long-range guns, mines, heavy artillery, and aviation favored the defender, leading most military professionals to discount amphibious operations after Gallipoli.[5]

Gallipoli once again demonstrated the need for combined arms warfare, mobile combat power able to rapidly cross the beach, tactical

loading, and planned deployment. The battle highlighted the criticality of units assaulting from the sea in their fighting formations with immediately available heavy firepower.[6] Gallipoli's failures lay more in command and control and maneuver than in ship-to-shore movement. Gallipoli demonstrated that ship-to-shore movement could occur under modern fire.[7]

Gallipoli also showcased the experimental use of attack transports and landing craft. These revolutionary developments served as models for the landing craft and vehicles of the future. During Gallipoli the British had experimented with both the River Clyde and the Beetle. The River Clyde was a landing craft and the Beetle was more of an armored assault craft.

The River Clyde was a modified old collier that carried assault troops close to the beach and allowed a smooth transition from sea to shore.[8] Doors were cut into the River Clyde's sides allowing barges or causeways to join and provide a gangway to the shore. During the assault, the employment of the River Clyde failed. The River Clyde employed as a singular assault means was largely unsupported and unsynchronized into the overall campaign. Additionally, strong currents in the landing area pushed the causeways away from the River Clyde during landing operations. Without the means for a smooth transition ashore, enemy fire annihilated the forces as they floundered through the surf.[9] In theory, the River Clyde would have swiftly delivered the assault force, but poor planning and execution of the entire operation doomed it to failure.[10]

The other ship-to-shore development during Gallipoli was the Beetle. The Beetle was introduced to support a night surprise landing. The Beetle was a small craft specifically designed to land troops on a beach. The Beetle was self-propelled and armored to deliver 500 troops safely onto a beach. The Beetle's assaults were very successful, but were not opposed. As a result, the Beetle never assaulted under fire. However, the Beetle provided a capability for smoothly delivering troops ashore.[11]

More than anything, Gallipoli provided an example for studying the conduct of the amphibious assault. Operations at Gallipoli had demonstrated a successful amphibious withdrawal as well as several successful assaults. While most planners looked at Gallipoli for reasons not to assault from the sea, U.S. Marine Corps planners used Gallipoli as a tool to develop an amphibious capability.

> The landings at Gallipoli validated the concept of an amphibious assault and provided a checklist of how not to plan the operation. However, the most important aspects of Gallipoli were the concepts leading to development of amphibious landing craft and ships. Ironically, the British did not fully understand the lesson, for example as late as 1943 Admiral Lord Keyes, Director of Combined Operations, during WW II wrote about the folly of attempting to storm a defended beach in daylight.[12]

Reinforcing Admiral Keyes' viewpoint were comments by B. H. Liddel Hart, who concluded:

> The development of air-power has greatly diminished the possibilities of a sea-borne invasion. . . . Only against some isolated colony, out of reach of air reinforcement from the mother-country, does there seem to be a chance for overseas invasion under present day conditions.[13]

Important to the study of Gallipoli is the state of warfare during that time. Attrition warfare and new-found weapons lethality

dominated the war planning. Previously, cavalry provided tactical mobility to land forces, but weapons lethality overpowered cavalry. Maneuver was chiefly considered at the strategic and operational levels of warfare. Tactical mobility and maneuver warfare were dominated by the trenches and wars of attrition. Therefore, amphibious planning projected forces against key enemy locations with the general concept of slugging across the beach. Moreover, there was no attempt to link subsidiary unopposed landings with the main effort. Finally, subsequent maneuver ashore was not coordinated or planned to support the overall campaign.

Gallipoli highlighted that the most difficult portion of the amphibious operation was not the landing, but being able to continue the assault inland. Planners had to plan beyond the beachhead. The desired endstate was a seamless maneuver from the sea to an inland objective. The challenge was ensuring availability of reinforcements, supplies, and supporting arms.[14] An interesting note came from the Turkish General Staff's history of the campaign:

> Had the British been able to throw stronger forces ashore at Gaba Tepe either by reinforcing more rapidly, or by landing on a broader front, the initial successful advance of 2,500 yards in depth might have been extended so as to include the ridges overlooking the straits, and a serious, perhaps fatal, blow struck at the heart of the Turkish defenses.[15]

Developing an Amphibious Capability

Most military planners were willing to write off the amphibious assault following Gallipoli. Fortunately, some American planners drew different conclusions about Gallipoli. The daylight amphibious assault was feasible, the concept was valid, but the execution during Gallipoli

was flawed. At this point the US Marine Corps enters the amphibious scene. The Marine Corps and Navy saw the need for amphibious assault capabilities to protect United States' vital interests abroad. One visionary Marine was Earl Ellis. Ellis's advanced reconnaissance and study of the Pacific theater had predicted the eventual island hopping campaign against Japan. Ellis' study went far beyond strategy. He addressed the full range of tactical, technical, and practical problems confronting amphibious assaults in the region. He warned of problems with man-made and natural obstacles such as reefs. He saw the close integration of fire support and need for combat loading of forces and logistics. Finally, Ellis' study articulated techniques, such as raids and demonstrations as a part of the amphibious operation.[16]

Considering both threats to the nation's interests and political concerns among the services, the Marine Corps began a crusade to develop amphibious capabilities. A series of training exercises and experiments was used to develop doctrine, training, and equipment requirements.[17] Inherent in these developments was the realization of the changes in warfare. The battlefield was more lethal and mobile. The development of the tank, command and control systems, and the airplane facilitated German Blitzkrieg doctrine. The Louisiana Maneuvers conducted by the Army featured a more maneuver-oriented battlefield with tremendous lethality. These developments also changed the requirements for amphibious warfare. Surviving on the modern battlefield required forces assaulting from the sea to have immediate mobile combined arms capabilities. This meant that landing craft were required not only for infantry, but for tanks, artillery, trucks, and sustainment.

One answer to this need was the development of the Higgins boat. This vessel was developed by an industrial pioneer named Andrew Higgins. This shallow draft vessel was designed for the bayous of Louisiana and could beach and retract from a beach easily. The vessel was eventually modified with a bow ramp to disembark troops, trucks, and tanks. After much testing, the Higgins boat design was accepted for landing craft supporting United States' forces during WW II.[18]

> For the first time in history there was a reliable way to make tanks, trucks, tractors, artillery, antiaircraft weapons, and heavy engineer equipment a part of the beach assault.[19]

The Higgins boats were the forerunners of all present landing craft and those used in WW II.

Two general problems combined to lead amphibious developers to the next innovation. First, Major Earl Ellis had identified a problem with coral reefs to Marine Corps planners and combat developers during his study of the Pacific region. Coral reefs complicated matters as the water passing over them was generally too shallow for boats. Additionally, there was often heavy surf breaking on the reef's edge. Second, students of Gallipoli realized that moving supplies and support rapidly through the beach area to support sustained combat ashore was critical. The transition from sea to shore had to be smooth and rapid.

The answer to these problems came from an unlikely source. Donald Roebling, son of a steel and wire rope magnate, designed an amphibious vehicle for rescue operations in the Florida everglades. Roebling's design was a tracked vehicle at home at sea or on land.[20] Roebling's vehicle was called the Landing Vehicle Tracked (LVT) or amphibian tractor. The LVT was capable of launching from a stern gate

or bow ramp of an amphibious ship and proceeding ashore under its own power. Once ashore the LVT moved over land on tank tracks.[21] The LVT was initially thought of as a logistics support vehicle, capable of delivering cargo to inland dumps without the need to unload onto already crowded beaches. It was heavily employed in the Pacific island campaigns.

The LVT was not the only attempt at an amphibious vehicle. The British were attempting to solve the problem of moving combat power ashore. The tank's contribution to warfare during WW I led British developers to design an amphibious tank. Several models were attempted between WW I and WW II but none were successfully fielded.[22]

Amphibious Warfare During WW II

The Higgins boat was the basis for development of a fleet of landing craft employed during WW II. This fleet carried everything from personnel to tanks and supplies ashore. Their role was significant in moving from the sea to the beach and a key to success in the United States war efforts. This craft allowed the attacker to move rapidly from the sea to the shore and rapidly transition into the attack. However, the landing craft of the WW II era still could not conquer the problems of crossing reefs that limited the maneuver of landing craft. Additionally, there was still a pause at the beach as the craft stopped, lowered its ramp, and disembarked troops or vehicles.

Development of the LVT solved the reef problem. This amphibious vehicle would climb over such impediments and continue on to the beach. Beginning in 1942, with the Battle of Guadalcanal, the LVT was employed

to transport supplies from ship-to-shore prior to landing wheeled vehicles. The LVTs exceeded requirements. Resulting from their mobility across varied inland terrain, the LVT took on an additional role as a forward logistics vehicle. Operations on Guadalcanal demonstrated the success of the WW II version of the amphibious assault. The landing force moved ashore even with enemy air power opposing the landing. Moreover the operation demonstrated the integrated effects of naval gunfire, air, and a landing force capable of rapid ship-to-shore movement. However, Guadalcanal was considered only a partial success because the landings were not heavily opposed. A landing force with landing craft and LVTs still had not landed against a well-integrated beach defense.

Operations at Tarawa provided the opportunity to test the amphibious capability against a well-integrated beach defense. Because of the LVT's relatively thin skin and slow speed, the LVT had not been included in initial assault waves. However, coral reefs at Tarawa prevented landing craft from reaching the shore. The unique land-sea capability of the LVT was required to transport assault waves of infantry across the reef to inland objectives. The LVT success in this role at Tarawa validated the LVT as an assault conveyance. Moreover, the LVT was credited with a great portion of the Marine's success at Tarawa. As a result, all later Marine Corps amphibious assaults were led by LVTs.[23]

LVT employment at Tarawa caused significant developments in ship-to-shore maneuver capabilities. Because of the capability LVTs added to ship-to-shore movement, the Commanding General of Fifth

Amphibious Corps Major General H. M. Smith urged that more LVTs be produced and that they be fitted with more armor, more speed, better communications, and a ramp for ease in unloading. The continued requirement for more LVTs led to the employment of 800 LVTs landing sixteen assault battalions at Okinawa.[24]

Tarawa lessons learned resulted in several other innovations. After-action reports from Tarawa not only laid a requirement for LVTs to move infantry ashore but highlighted a need for combined arms forces including LVTs, immediately available light and medium tanks, and fire support. These assets were invaluable in meeting enemy pillboxes and hardened positions. Self-propelled weapons of all sorts were needed immediately to secure the landing area. Both firepower and mobility are needed in the landing force. Even with the great amount of naval gunfire available at the time, there was also an immediate need for artillery and rockets ashore to deliver close fires. Additionally, the landing force should never expect long range fires and close air support to destroy or neutralize enemy resistance. If a weapons system is not self-propelled, it must be embarked with its prime mover. Moreover, there is always a chance a landing craft will be stranded due to hydrography. The report called attention to the need for readily available resupply and the LVT was noted as the most reliable means of moving logistics ashore.[25]

The LVT fleet was expanded as a result of lessons learned from previous operations, such as Tarawa and Guadalcanal. Many armored variants were produced, transitioning the LVT from a combat support role to a shock troop role. Some of the variants included: LVT(3)

eventually fitted with overhead armor and a single machine gun turret, this configuration would be the workhorse of the post WW II Marine Corps; LVT(4) with a stern ramp and four .30 caliber machine guns, the most widely used variant in WW II; LVT(A)1 the first amphibious tank armed with a 37 millimeter main gun and two machine guns; LVT(A)2 primarily a cargo variant; and the LVT(A)4 mounting a 75 millimeter main gun.[26]

The substantial LVT developments led to conceptual changes for ship-to-shore maneuver. Troops landing in LVTs and supported by armored variants with 37 millimeter and 75 millimeter guns could attack inland objectives without first disembarking at the beach.[27] During the battle of Saipan, this concept was explored with marginal success. The marginal success is attributed to the rugged terrain and limited ground mobility of the LVT. Perhaps, because of this initial performance, the concept was rarely explored during and after WW II.[28]

Operations in Europe did not fully capitalize on the LVT technologies. The British did develop versions of the LVT for Operation Overlord. The British had developed amphibious tanks as early as 1918; however, they were not produced in any quantity. Moreover, LVTs saw limited use by U.S. forces in Europe. It is not surprising that U.S. commanders in Europe failed to appreciate the value of amphibious operations. Operations in Europe tied to landing craft and landing ships remained vulnerable and did not provide for immediate mobility ashore. These operations resembled displacements of whole armies rather than maneuver; once displacement of sufficient assets was complete combat could continue to inland objectives. General Bradley's 1949

statement that large-scale amphibious operations would never occur again only made sense when the amphibious operation was viewed in this context.[29]

However, European operations did demonstrate another capability of the LVT. Unlike in the Pacific, European operations contended with inland waterways. During operations in Europe, the British used LVTs to cross lakes and flooded plains. Moreover, the LVT's unique capabilities were used in river crossing operations across the Maas, Rhine, and Neirs by the British.[30]

The WW II era technologies provided a new capability to amphibious operations. Amphibious vehicles with armor and fighting capability provided the ability to expand the initial assault inland immediately. These unique vehicles also provided a capability to sustain the fight. This overall capability was a desired endstate throughout the history of amphibious operations. However, this capability was not fully developed. It is not until now with the concept of OMFTS that this capability is seen as a desired endstate.

Although Allied amphibious assaults in Europe were generally large displacement operations at the operational and strategic levels of war, the Soviets employed the tactical amphibious assault extensively. During defensive and offensive operations, the Soviets employed tactical amphibious assaults on the flanks of the Germans. The Soviets left WW II with seven key lessons for future amphibious warfare: (1) a need for artillery, naval gunfire, and close air support; (2) assaults should be rapid and of short duration; (3) the assault force needed great flexibility to rapidly maneuver at sea and on land; (4) maximum

increases to tempo of operations was required; (5) rapid reinforcement of the initial assault force was a must; (6) assaults should be coordinated with airborne (air assault later) envelopments; and (7) most important was increased tactical and logistical maneuverability of combat, combat support, and logistics assets.[31] The Soviet findings are similar to previous historical findings. Moreover, they directly reinforce the requirements of OMFTS.

Amphibious Warfare During the Korean War

LVTs once again played an important role in Korea. The Inchon landing was a success in part due to the flexibility of the LVT and landing craft. However, the most significant development of a ship-to-shore conveyance was the use of the helicopter. The helicopter gave the assault force a capability to bypass a beach or enemy position. LVTs did play an important role inland during the war in Korea. Assaulting forces used the LVTs inland to cross the Han River.[32]

Armored LVTs assumed a land combat role during Korea. During this period, LVTs were employed for fire support and as defensive forces inland. The LVT's maneuverability both ashore and on land coupled with its firepower, provided a multi-functional combat system. These capabilities demonstrated their utility in sustained combat and provided additional rationale for further development of this capability. Multi-purpose use of LVTs as both amphibious assault vehicles and vehicles for subsequent operations ashore substantiated the role of the LVT with an amphibious force. It also demonstrated that a family of

these systems could provide the basis of combat support required by an amphibious force.[33]

Amphibious Warfare During Vietnam

The helicopters became a vital part of the amphibious force during Vietnam. The helicopter was employed during the Korean War, but primarily for logistics efforts. In Vietnam it was integral to operations. The helicopter became a permanent part of the amphibious force and continues to play a critical role in amphibious operations.[34]

During Vietnam, LVTs were a part of the many amphibious operations conducted by the Marine Corps. The LVT(P)5 was the primary personnel and cargo carrier, while the LVT(P)6 mounted a 105 millimeter main gun for assault support. The significant part of Vietnam was the solidification of the ground role for LVTs. LVTs maneuvered inland, crossed wetlands, conducted riverine operations, and provided heavy fire support. Amphibious vehicles now had a dual land and sea role in the Marine Corps. The LVT was now expected to spend 80 percent of its operating time on land as both transportation and a fighting vehicle.[35]

The land employment of LVT resulted from the changing nature of warfare and fiscal realities. The Marine Corps expeditionary nature requires it to not only deploy quickly, but to respond immediately with forces on hand. Specific equipment just to land forces in an assault is a luxury; equipment should be multi-functional. The nature of Vietnam and Korea, as well as the numerous contingencies the Marine Corps responded to between Korea and the present day, required a means to get ashore and immediately maneuver inland.

As previously discussed, the helicopter now performed a portion of this role. The helicopters role in ship-to-shore movement, as well as maneuver ashore, cannot be overemphasized. The helicopter is critical to current and future capabilities, but for the purposes of this study it will not be discussed in detail. However, ship-to-shore mobility evolved to include a triad of conveyances: the helicopter, the LVT, and the landing craft during the Korea and Vietnam time-frame.[36]

By the conclusion of Vietnam, the nature of warfare had also changed. United States National Military Strategy required a force capable of defeating a sophisticated threat in conventional warfare and capable of responding to numerous unconventional threats. The nature of these missions required a multi-functional and logistically self-sustaining expeditionary force. Projecting power required complementary surface and aviation systems to respond in various situations.

The Falklands

The British campaign in the Falklands provided an example of using the sea to maneuver across a beach, then establish forces ashore, and subsequently seize inland objectives. The Falkland Campaign is a transitional campaign between conventional amphibious operations and OMFTS. The British did not have the capability to maneuver a seabase located well at sea or over the horizon. Their landing craft required amphibious ships to maneuver close to shore to support maneuver ashore. This lack of capability resulted in the loss of an amphibious ship and

in the lack of surprise. However, they used their capability to land across a beach and avoid urban and well-defended areas.[37]

During the Falkland Campaign, a British battalion was ordered to attack Darwin and Goose Green, two settlements located on a narrow isthmus. The plan was limited by a number of conditions. The beaches did not support landing craft, and the weather limited helicopter and close air support. Because of these limitations, the battalion had to conduct an overland foot assault with limited fire support, violating the requirement for an integrated combined arms force. During the campaign, the lightly armed British forces were pinned down on several occasions by .50 caliber heavy machine guns and 30 millimeter antiaircraft guns used as direct fire. Mortars and close air support were ineffective due to terrain and weather leaving the British commander to remark afterwards that the 76 millimeter and 30 millimeter guns of the Scimitar and Scorpion light tanks would have made short work of the enemy's heavy weapons, allowing a faster and more devastating tempo.[38] It was only the fighting abilities of the British that averted a disaster. Clearly this historical example illustrates the need for surface ship-to-shore maneuver capabilities that allow the commander to exploit the maneuverability of the sea.[39]

Conclusion

Throughout history projecting power and influence for a maritime nation such as the United States required deploying across a foreign shore. Capabilities for such power projection have developed through time in relation to technology and warfighting needs. However, during

the greatest portion of recorded history, the ingredients for successful power projection have remained constant. These ingredients for success are: unhindered sea maneuverability; rapid movement ashore; immediate or, at least, a rapid transition into land combat maneuver; and immediately available combined arms capabilities and logistics. The next chapter provides an examination of current capabilities to assess any additional ingredients for success and determine capability relative the concept of OMFTS.

CHAPTER 4

CURRENT CAPABILITY

Introduction

Funding cutbacks, down sizing, and past concern with a European Soviet threat greatly affected today's capabilities for amphibious operations.[1] Force projection was not a focus in the past twenty years. The "Cold War" strategies, overseas basing, and priority for stability in Europe, rather than responding to regional threats and crises, drove military development to heavy weapons designed for the European theater.[2] Although the Marine Corps' principal role during this period was worldwide regional response, economics and efficiency in combat development prescribed that the Marine Corps use many of the weapons platforms and systems designed for the European theater. Moreover, during this period, the Marine Corps followed the Army lead into projects like the LAV, M1A1 Tank, and M198 howitzer. These are arguably some of the best weapons systems in the world, but were not designed with amphibious operations or ship-to-shore movement in mind.

Increasing worldwide instabilities have focused military planners on projecting power in support of the United States' National Military Strategy.[3] Power projection requirements have resulted in maritime and land prepositioning programs, Logistics Over The Shore (LOTS) development, and a renewed focus deployability, to include amphibious capabilities. However, the general decline of ports and

infrastructures worldwide makes the use of prepositioned ships and commercial or military sealift an unreliable option. The need for the Nation's amphibious capability has never been greater. Recent operations in Somalia highlighted the problems of reliance on port facilities. Moreover, continued reliance on ports invites disaster. Consider that ports are in urban areas, escalating the potential for intensive combat in a built up area. Operations in urban areas are generally protracted and costly in terms of manpower and equipment, and therefore not conducive to a rapid power projection operation.[4]

Along with military down sizing there has been a general decline in amphibious capability. During WW II, the amphibious fleet totaled 1,728 ships, and today, the fleet totals around forty active amphibious ships. Moreover, near the end of WW II 20,000 amphibious vehicles for ship-to-shore maneuver existed. Today, the entire fleet of amphibious vehicles totals approximately 1,300 Amphibious Assault Vehicles (AAVs).[5]

The amphibious fleet of forty ships supports a fiscally constrained budgetary goal of two and one-half Marine brigade amphibious lift equivalents. Reduced amphibious lift capacity necessitated alternate power projection methods. A complementary capability to amphibious lift is Maritime Prepositioned Shipping (MPS). MPS provides an economic method to offset reduced amphibious shipping and reduce deployment time. MPS consists of three strategically positioned squadrons or MPSRONs of three-to-four ships. Each squadron provides the heavy nucleus of a Marine Expeditionary Force along with thirty days of combat sustainment. The ships within each MPS Squadron (MPSRON) are not amphibious ships but commercial-type freighters modified for long term

storage of military equipment. These ships are not only less survivable but have a deeper draft than an amphibious ship. Deeper drafts limit their beach and port accessibility. Although these ships can be off-loaded while at sea, they require calm seas and a benign staging area ashore. Therefore, either an assaulting force must first secure a beach or port and a nearby airfield. Host-nation support is not required, but is helpful in these operations. Therefore, MPSRONs are not power projection capabilities but are assets to support airborne or amphibious capabilities.[6] Unfortunately, overflight rights and host-nation permission and support are not guaranteed. Additionally, forward basing rights are also not guaranteed or feasible in all regions where a crisis may occur. Fully realizing the benefits of control of the sea and sea basing requires amphibious capabilities that permit flexible and rapid tactical maneuver.

Amphibious operations with inherent ship-to-shore maneuver continue as a vital tool. In numerous recent contingencies amphibious forces played a significant role. In the Liberia noncombatant evacuation operation between 5 and 22 August 1990, amphibious forces evacuated 1,647 civilians. Political constraints required the amphibious ships to remain over the horizon, a distance too great for conventional amphibious vehicles, and forced helicopter forces to conduct the entire operation. Limited helicopterborne operations due to a singular landing zone and weather problems significantly slowed the operation.[7]

Amphibious vehicles were used extensively in Somalia. Somalia's poor infrastructure and ports restricted movement. However, Marine

forces had immediate tactical mobility ashore with amphibious vehicles assaulting across the beach. Although not a forcible entry, the benefit of surface ship-to-shore maneuver was immediately realized with AAVs immediately participating in convoys, river crossings, and security operations.[8]

Whether a relief effort in Liberia or Somalia, deterrence in Kuwait, or special operations in Bosnia, ship-to-objective maneuver of forces is conducted successfully using helicopters, landing craft, and amphibious vehicles. However, ship-to-objective maneuver faces many challenges including smart weapons, long range intelligence, aviation, weapons of mass destruction, mines, and the increased lethality and mobility of the threat. These threats are only expected to proliferate in the future. These challenges complicate amphibious operations and maneuvering combat power to inland objectives. Answering these challenges require naval services to adapt its approach to amphibious operations.

Doctrine

The sea offers strategic, operational, and tactical mobility to those who control it. For most of the twentieth century, options created by control of the sea have been constrained by requirements for operations ashore. In the past, the focus of the amphibious assault was the Force Beachhead Line (FBHL). The intent of the amphibious assault was to establish a lodgment area of sufficient size to allow the unencumbered flow of combat power ashore. The operation looked inland

to geographical objectives that supported the operational goals of the campaign.

Amphibious doctrine that establishes a FBHL traces its origins to the Marine Corps WW II doctrine. Ship-to-shore maneuver during WW II required a slow deliberate buildup of combat power before conducting operations inland. In 1944 Allied control of the seas was sufficient to permit landings anywhere along the extensive Atlantic coast of France. However, the landing force's voracious appetite for fuel and ammunition restricted the choice of landing areas to those easily supplied from Great Britain through established ports. Thus, support of the landing force dictated specific landing points.[9]

Over the last fifty years, only a few developments in ship-to-shore movement have improved the capability. Most notably are the helicopter and LCAC. As a result, doctrine has remained remarkably similar. Moreover, the naval service doctrinally approached amphibious operations in three phases: maneuver in ships, ship-to-shore movement, and maneuver ashore. Interpretations of doctrine further delineated ship-to-shore movement into distinct events. This is evident in the frequent discussion of establishing the FBHL, logistics, command and control, fire support, and maneuver capability ashore before operations inland. These distinct events helped establish functional splits between naval and land components. The result has been separate force development rather than as one synergistic force.[10]

The traditional goal of ship-to-shore movement was to rapidly build combat power ashore. The method was to locate a broad beach that supported moving the landing force ashore and provided a suitable area

for establishing a beach support area. Subsequently the landing force would assault inland as combat support and combat service support arrived ashore to support the maneuver. The sequential and seemingly lockstep doctrine associated with amphibious operations and ship-to-shore movement fostered a slow and deliberate process often associated with attrition warfare tactics of "slugging it out" across the beach. However, a renewed focus on responding to worldwide crises coupled with an intolerance of casualties, increased lethality, and greater mobility of today's military forces resulted in an evolution to a maneuver based concept for amphibious operations.

The renewed appreciation for the operational significance of littoral regions spurred the need for doctrinal change. OMFTS ensures the ability for influence within the littoral regions and is a catalyst for change across all combat development. Tactics and techniques for ship-to-shore maneuver prior to OMFTS were linear and did not fully exploit the mobility offered by the sea. These tactics and techniques leave the assault force and the sea base vulnerable to antiship and ballistic missile threats. Increased threat lethality and enhanced battlefield awareness further increases the vulnerability of forces using this doctrine.[11] Under OMFTS, assault forces desire to project power from far at sea providing standoff distance for protection of the sea base and require the flexibility in maneuver to allow choosing a landing area that provides for security and suprise. Seaward distance and maneuver range translates to force protection.

The salient physical characteristic of OMFTS is unencumbered maneuver. For the purposes of a force that will operate in littoral

areas, the barriers to such maneuver lie less upon the land or sea, or within the air, but at the places where these environments meet. Thus, the need is for quick and seamless transition between environments and a resumption of rapid maneuver. The tremendous advantage of maneuvering at sea is not a new concept. Caesar's amphibious operations in Britain showed the use of maneuver, flexibility, and multiple landing sites. Additionally, operational maneuver, such as Operation Chromite, the successful assault at Inchon, demonstrated maneuver at sea in a more recent context.[12] Moreover, Desert Shield and Storm demonstrated advantages of seaward maneuver of amphibious forces. Initially, amphibious capability offered an early deterrent to Iraqi aggression, and subsequently, the threat of an amphibious assault confused and divided the Iraqi defensive forces.[13]

The United States' unparalleled control of the sea opens the uninterrupted maneuver space of the littoral regions. Exploiting this maneuver space provides a distinct advantage both for power projection and sustained combat ashore. Under the concept of OMFTS, planners think in two phases: maneuver in ships and maneuver in support of combat operations ashore. This philosophical change applies to all operational maritime maneuver, whether a forcible entry operation, sustainment of operations ashore, or as a part of the myriad of expeditionary operations that naval forces take part in.[14] Amphibious operations are now nonlinear maneuver from the sea. Unlike inland terrain, the ocean is flat and open. These characteristics support maneuver and allow landing forces to land at multiple littoral penetration points. Using the sea as maneuver space, the landing force can mass at sea or bypass

resistance while at sea, land at multiple penetration points, and mass ashore.

Today's capabilities and doctrine for ship-to-objective maneuver are transitioning. The thought processes for OMFTS are present. Both doctrine and training are being redefined under OMFTS. However, equipment limits full realization of the concept of OMFTS. Additionally, Over-the-Horizon (OTH) capabilities are confused with unopposed landing and the whole concept of OMFTS. OTH means the assault force launches the assault from ships located over the horizon or hidden from enemy shores or view. The goal of this tactic is to protect the sea base from enemy fires and increase surprise. OTH may or may not occur under OMFTS and does not guarantee a benign landing. OTH capabilities, specifically range, simply adds to security, surprise, and flexibility. Capability enhancements of OTH range and speed do not eliminate a potential fight, but do reduce the defender's advantages through effective use of maneuver.[15]

Ship-to-Objective Maneuver Capabilities

Today's amphibious forces employ a triad of ship-to-objective maneuver capabilities. Landing craft and amphibious vehicles provide the surface means, while the helicopter provides the means for vertical assaults.

Amphibious Assault Vehicle (AAV)

The AAV is a 1972 vintage, tracked armored personnel carrier fielded in three variations: personnel carrier, command and control, and retriever. The AAV is unhindered by natural offshore obstacles that

impede other landing craft and is armor protected against artillery fragmentation and heavy machine gun fire. The AAV can negotiate sea state 3 and up to ten feet of plunging surf while remaining waterborne for seven hours. The vehicle has a cruising range ashore similar to a main battle tank, approximately 285 miles. Armed with a .50 caliber machine gun and a forty millimeter automatic grenade launcher, the AAV provides supporting fires and mobility to Marine Corps infantry. Once ashore, the AAV can negotiate almost any water obstacle regardless of current, width, and depth and is ideal for river crossings. Moreover, most waterways are avenues of approach for the AAV. The AAVP-7 carries eighteen combat loaded Marines (twenty-one including crew) or 10,000 pounds of cargo. The AAV generally carries personnel from the sea and subsequently ashore as a mechanized infantry carrier. The cargo hauling capability is often ignored, but it is significant, as the AAV can reach many otherwise unreachable areas. The AAVP-7 is flexible enough to haul anything from casualties to ammunition. Additionally, the vehicle can be configured with a three-shot, mine clearing line charge for breaching operations. All vehicles in the family have smoke-producing and discharging capability. Recently, the addition of appliqué armor increased the AAV's protection and survivability.

Although the AAV is a very versatile platform, the advent of the threat-driven, OTH concept (that preceded the OMFTS concept) coupled with the age of the current AAV7A1, warranted the Marine Corps' initiation of a Mission Area Analysis (MAA) in 1987. The MAA purpose was to identify specific deficiencies in current amphibious assault capability. The MAA determined the AAV7A1 demonstrated significant

deficiencies--during both water and land operations--in offensive and defensive firepower, water speed, land speed, agility and mobility, armor protection, and overall system survivability.[16]

Maneuver, the salient characteristic of OMFTS, was the most significant deficiency in the current AAV. The AAV's five to six nautical miles per hour water speed is unsuitable for over the horizon or flexible maneuver at sea. This reduced speed also limits its ability to use alternate littoral penetration points. Additionally, the AAV lacks the cross-country maneuverability, lethality, and survivability to form a coherent mechanized fighting force with M1A1 tank or Light Armored Vehicle (LAV) employed by the Marine Corps.

The current AAV family has no capability to fire on the move once ashore or during ship-to-shore movement. The vehicle can provide stationary suppressive fire but has limited effectiveness against vehicles, armor, or fortified positions. There is no fire support or engineer variants of the AAV that were critical capabilities during WW II, Korea, and Vietnam.[17] Currently, there is no amphibious reconnaissance vehicle. Additionally, no air-defense variant exists, an essential element on today's battlefields. This deficiency requires employment of LAVs or HMMWVs in conjunction with LCAC or helicopter ship-to-shore movement to meet mobile reconnaissance, security, and air defense needs.

Light-Armored Vehicle (LAV)

The LAV is a 1982 vintage, wheeled light-armored vehicle. It is fielded in six variations: 25mm chain-gun, mortar, command and control,

antitank, logistics, and retriever. Though very lightly armored, it is an excellent reconnaissance vehicle and has unsurpassed maneuverability inland. Rather than maintaining and developing a full family of capability in an amphibious platform, the Marine Corps has pursued the LAV family for development of multiple capabilities. The LAV provides a more agile and less expensive platform for operations ashore. Current LAV variant capabilities include: LAV-25, reconnaissance and security and destruction of light armor; LAV-M, 81 millimeter mortar (potential for 120 millimeter mortar); LAV-R, recovery and maintenance; LAV-L, logistics; LAV-C2, command and control; and LAV-AT, antitank variant. Additionally, two other variants, the LAV(AD) which is under development provides a mobile air-defense capability and the LAV-based MEWSS provides an information warfare capability.

Combining the LAV with the LCAC provides a method for the Marine Corps to maneuver armored vehicles ashore rapidly for use in reconnaissance and security roles and as a light-armor assault force. Employment of the LAV early in the ship-to-objective maneuver is essential in providing standoff and protection from enemy maneuvering to counter a landing. Additionally, the family of LAVs provides an ideal raid capability in support of ship-to-objective maneuver.[18]

The entire family of landing craft can transport the LAV. Additionally, LAVs are air transportable by CH-53 helicopters in extreme situations. This option is not preferred because the heavy load of the LAV reduces speed and maneuverability of the CH-53, thus affecting its survivability.

Other Platforms

Additional capabilities for fire and maneuver ashore exist in the M1A1 main battle tank and the M198 howitzer, a towed artillery system. Because of the M1A1's weight only two landing craft are capable of maneuvering it ashore. The LCAC transports one M1A1, while the LCU can transport two M1A1s. The M198 is the principal surface means for delivering fire support to the landing force once ashore. Although the M198 delivers superb firepower, it is difficult to maneuver and as a result of being a towed howitzer very susceptible to counterfire.

Additionally, there is no mobile engineer platform. Studies assessing the Marine Corps capability to conduct maneuver from the sea have shown weaknesses in several areas to include an inadequate capability to overcome man-made and natural obstacles. Current MAGTF operations lack the capability to conduct a forcible entry from either over the horizon or near shore because of an inability to detect and breach minefields rapidly and otherwise breach deliberate obstacles. Mine warfare is affordable and widespread, resulting in a threat to ship-to-objective maneuver operations. Mine clearance systems in service today are of 1960s technology and incapable of meeting the challenges presented by new mine designs. Presently, the Naval service has a limited capability to clear landing beaches from the high water mark out to sea. Marking and clearing boat lanes from shallow water depths up to the high water mark is limited, and there is no timely method for marking safe lanes to meet the needs of a maneuver from the sea or on land.[19]

Landing Craft

Conventional Landing Craft

Two basic types of landing craft represent the present day model of the WW II era Higgins boat. The older conventional systems include the Landing Craft, Mechanized (LCM-8), and the Landing Craft, Mechanized (LCM-6). These crafts travel at between nine and twelve knots, can be off-loaded via a bow ramp or by crane from the open cargo area. The LCM-6 lands medium-weight vehicles, equipment, personnel, or cargo on the beach during an amphibious assault. The LCM-6 carries up to thirty-four tons. The LCM-8 lands heavy vehicles, equipment, personnel, or cargo. This landing craft permits firing of embarked fighting vehicles and tanks during ship-to-shore movement. The LCM-8 can carry up to sixty-five tons.

The current version of the WW II tank landing craft is the Landing Craft, Utility (LCU). The LCU was originally designed to land tanks, but due to its versatility and use in landing almost anything, subsequently, it was designated a utility landing craft. The LCU travels at eleven nautical miles per hour under a full load of over two-hundred tons. Equipped with a stern and bow ramp, the LCU is off-loaded via the bow ramp or in a drive through configuration. Its design allows joining it with other systems to form a causeway in ideal sea states.

LCMs and LCUs are complementary systems to the AAV family. Their similar speed provides a capability to assemble and integrate amphibious waves for the beach assault. Their relative slow speeds do not allow assaults from over the horizon. These systems lack the range

and speed for flexible maneuver over great distances and the flexibility to maneuver to alternate littoral penetration points. Moreover, the limited range and speed of these crafts restrict ship-to-shore movement to short range operations on predetermined beaches.[20]

Landing Craft Air Cushion (LCAC)

The newest generation of amphibious assault landing craft is the LCAC. The LCAC employs air cushion vehicle technology to deliver a seventy-five ton load from a distant sea base at speeds in excess of forty nautical miles per hour. The normal planning range for an LCAC is up to one-hundred and fifty nautical miles. A maximum load reduces the operating range to approximately one-hundred nautical miles. The LCAC is capable of maneuver at sea carrying any system in the Marine Corps inventory, exiting the water, and maneuvering inland to a dry landing point. The LCAC operates independent of underwater beach gradients, underwater obstacles, tides, and beach consistency. Once ashore, the LCAC can traverse ditches, vertical steps, and a thirteen degree grade enroute to a landing zone. Moreover, as it travels above the water and land, the LCAC is less susceptible to mines.

The increased capabilities of the LCAC facilitate a rapid buildup of combat power ashore and operations from over the horizon. The LCAC is capable of ship-to-shore maneuver on over 85 percent of the world's coastline, four times more than other landing craft. Although the LCAC is unarmored, its superior range and speed provide protection. Even if the enemy realized that an amphibious assault was occurring, the LCAC is flexible enough to bypass an enemy.[21]

The LCAC is an integral part of the current and future ship-to-objective maneuver capability. Presently there are approximately seventy LCACs in the inventory, with a final procurement objective of ninety-one craft.[22] Presently, LCAC movement is sequenced with the other slower craft and slower AAVs in large scale landings. However, the LCAC does provide an over the horizon capability when teamed with helicopter employment. Additionally, employing LAVs, AAVs, and tanks aboard LCACs provides a rapid advance or a raid force to secure key objectives in support of the assault. The LCAC will become the cornerstone of heavy surface tactical mobility from the sea.

Helicopters

Over the last thirty years the helicopter's role has developed significantly in ship-to-shore or objective maneuver. The helicopter adds a new dimension to ship-to-objective maneuver. The helicopter bypasses the problems of immediately establishing a beachhead, surf obstacles and mines, shore-based antiship missiles, and immediately confronting an enemy at the beach. Helicopters make it possible to land assault forces in places impregnable to the amphibious assault. Moreover, the flexibility afforded in helicopters allows the heliborne landing force to launch from ships underway and dispersed. The helicopter's dramatic impact resulted in development of specialized ships for both helicopter and surface launch.[23]

The helicopter provides the long sought after capability to launch an amphibious assault from over the horizon to achieve tactical and operational suprise. The Marine Corps envisions ship-to-objective

maneuver as a coordinated action, where the vertical assault and surface assault support each other. The Marine Corps family of assault helicopters, the CH-46 and the CH-53, are the means for vertical assaults. The CH-46 primarily moves personnel and the CH-53 is the heavy lift helicopter for sustainment and heavier warfighting assets. The CH-53 is much newer than the CH-46 and continues to assume more of the personnel role.[24]

However, lift limitations and vulnerabilities preclude the helicopter's exclusive use for ship-to-objective maneuver. The helicopter carries predominately light forces. Heavier weapons, such as a HMMWV-mounted Tube-Launched, Optically-Tracked, Wire-Guided Antitank Missile (TOW), heavy machine guns, mortars, and sustainment, can be air assaulted. However, heavier systems, such as armored vehicles, cannot. The CH-53 can sling lift the M198 howitzer to a desired area. However, without immediately lifting its prime mover and ammunition, the howitzer lacks any mobility or logistical support.[25] Moreover, the LAV can only be air assaulted after stripping key components and some ammunition and fuel. During Desert Storm the opportunity to airlift LAVs did occur, but the operation was not considered viable. Neither load is maneuverable once airborne, reducing its practicality and survivability for a tactical operation.

Current Notional Capability for Ship-to-objective Maneuver

Assessing the current capability for ship-to-objective maneuver involves considering all forms of maneuver ashore and the amphibious lift necessary to arrive in the amphibious objective area. Several

notional schemes exist for assessing or wargaming amphibious forces. Without calling up amphibious shipping from the Navy's Ready Reserve Fleet, the Navy can provide enough amphibious lift for two and one-half Marine Expeditionary Brigades (MEBs). A MEB was a term used to describe a previous standing Marine Corps organization built around an infantry regiment, composite air group, and brigade service support group. MEB is currently sometimes referred to when discussing amphibious lift.

A notional amphibious planning exercise used for training at the Marine Corps' Amphibious Warfare School employed fifteen amphibious ships. These fifteen ships carried a mixture of ship-to-shore maneuver assets. The surface assets included: two companies of AAVs; twelve LCACs; thirteen LCUs; eight LCM-8s; and eleven LCM-6s. Leading the maneuver from the sea was a Light Armored Reconnaissance (LAR) Company (mounted in LAVs) reinforced with a tank platoon. The twenty-four LAVs and four tanks were embarked on ten LCACs for ship-to-shore movement. This force assaulted to isolate and seize key terrain that supported a continued assault from the sea. The AAVs self deployed carrying two battalions of infantry, thirty minutes after the LAR Company arrived ashore. The AAVs were ashore within one hour. Two additional tank companies which were pre-boated in LCUs and LCACs landed during the first two hours of the assault. During the surface assault one infantry battalion was simultaneously air assaulted to an inland objective. The assaulting infantry battalions maneuvered ashore with heavy machine-guns and TOW antitank weapons mounted on HMMWVs.

The assault forces were able to maneuver ashore quickly. However, the required deployment of combat support and combat service

support was drastically slowed. These assets required surface lift and had to be embarked aboard recycling landing craft for the movement ashore. This particular operation was not planned as an over-the-horizon assault, amphibious shipping was brought near the beaches, and the maneuver ashore was linear with no flexibility to use alternate beaches or littoral penetration points. Moreover, the operation still required several hours to build sufficient forces with combat support and combat service support for an attack inland. While the buildup occurs, the enemy can maneuver to counter the landing and attrit the landing force. Although assault forces moved ashore quickly, they lacked the artillery, engineer, and combat service support for inland maneuver. Changing the landing plan did not improve the ability to maneuver inland faster. Moreover, any additions to the future MAGTF such as command and control vehicles, breacher vehicles, bridging, or fire support systems that are not amphibious, directly impact on ship-to-shore movement. Additional assets requiring lift ashore are in direct competition with LAVs, tanks, and current combat and combat service support. Future additions become a zero sum gain in attempting seamless maneuver from the sea to inland objectives.[26]

Another notional force discussed by Marine Corps planners consists of nine-to-twelve amphibious ships.[27] This force deploys with twenty-four LCAC and AAVs for surface tactical maneuver. The added LCACs improve the capability for amphibious standoff and maneuver speed. Initially, the LCACs lift LAVs, artillery, and tanks ashore, but turn-around time is still necessary to reload combat support and service support slowing the operation. Following the LCACs, one battalion air

assaults ashore and two battalions of infantry in AAVs surface assault. However, the limited range and speed of the AAV require the amphibious ships to maneuver close to the beach. The recycling LCACs increase the delivery rate of maneuver units, combat support, and combat service support. The additional LCACs support a quicker transition to maneuver inland. However, the speed, range, and combat capability of AAVs and LCAC turn-around time are limitations in ship-to-objective maneuver capability. Moreover, although LCAC provides for flexible seaward maneuver and deployment from a distant seabase, the AAVs must deploy from a sea base near the shore. Using LCACs to ferry AAVs from a distant sea base to near the shore is an option, but severely reduces available lift for additional assets.

The increased LCACs support the maneuver of a mechanized combined arms team with an LAV company, an AAV platoon with one infantry company, an artillery battery, and a tank company minus from a distant sea base. This mechanized force coupled with an air-assault battalion and close air support provide for limited rapid inland maneuver.

These two scenarios illustrate the vast contribution the LCAC makes to ship-to-shore maneuver. In both scenarios assault forces with self-deploying amphibious vehicles and preloaded landing craft move ashore rapidly. However, the slower speed and limited range of the current AAV, turn-around time required for landing craft and LCAC, and lift capabilities of helicopters limit the landing forces initial combat power and its ability to transition to combat ashore. Moreover, a lack of combat and combat service support restrict the capability for immediate or seamless operations ashore. The combined requirement for

turn-around trips of LCACs or landing craft limits the standoff of amphibious ships, curtails the flexibility of maneuver from the sea, and reduces survivability of the sea base and landing force.

The discussed scenarios illustrate the limitations imposed by current equipment on a landing force. Given current equipment, a limited OMFTS capability is available using the LCAC and helicopter. For example, LCAC lifted forces and heliborne forces employed in advance, isolate a landing area for slower AAVs and landing craft. However, the speed and range of the AAV, conventional landing craft limitations, and LCAC availability limit the ability to use the sea as maneuver space.

Current Capability Assessment

Current capabilities restrict the landing force to shorter and slower maneuver at sea and require amphibious shipping to maneuver closer to the shore and the enemy. The principal deficiency relative to surface tactical mobility is the ability to maneuver rapidly from a distant sea base with sufficient combined arms, land mobility, support and sustainment. Continued use of landing areas to build up sustainment and combat support negates the advantages gained by maneuvering at sea. The landing force becomes vulnerable to weapons of mass destruction, tactical ballistic missiles, advanced battlefield awareness, and a highly lethal and maneuverable enemy.[28]

Interviews of Marine officers attending the Command and General Staff College at Fort Leavenworth, KS, revealed the same general conclusions. These officers viewed surface tactical mobility for linear

under-the-horizon assaults from the sea as satisfactory. However, extensive maneuver from a sea base, possibly over the horizon, requires an improved capability. Notably, deficiencies were cited in landing craft capability, quantity, training, and survivability. Specifically, LCAC quantities deployed aboard ship do not provide for moving combat service support ashore in a timely manner. Additionally, LCAC crews are reluctant to move inland due to concerns over survivability and reliability. Current helicopter lift and range limit the ability to maneuver assault forces, combat support, and sustainment ashore. The current CH-46 is deficient in all aspects. The AAV's speed, reliability, range, and combat capability were noted as a severe limitation for the landing force. Overall, the students agreed that an operation from near shore was executable, but current capabilities do not allow for the maneuver described in the OMFTS concept. Moreover, this conclusion follows noted deficiencies from analysis conducted at the Marine Corps Combat Development Command (MCCDC).[29]

Mission Area Analysis 21 and the Ground Combat Tactical Mobility Equipment Assessment, conducted by the MCCDC list replacing the AAV as the number one Marine Corps ground combat development priority. A major deficiency in the current AAV is the land and water speed necessary to deploy from far at sea to an inland objective.[30] Additionally, both evaluations describe survivability, inland maneuverability, and lethality as some deficiencies in the current system. These evaluations also describe deficiencies in current heavy helicopter lift, fire support, combat engineering, and overall inland tactical mobility. Moreover, fire support problems are complicated in ship-to-objective

maneuver by naval surface fires and difficulty maneuvering the M198 howitzer ashore and inland.

Conclusion

The principal ship-to-shore maneuver deficiency noted in the assessment process was the ability to maneuver rapidly from a distant sea base with sufficient combined arms, land mobility, support and sustainment. Specifically, the land and water speed of the current AAV are significant deficiencies. The LCAC's high water speed and flexibility to land in most littoral areas are noted as significant capabilities. However, limited numbers and survivability of the LCAC is a concern. The desired capability is LCAC speed and range at sea and LAV mobility once ashore for all surface tactical mobility components. The biggest concern is how to achieve this capability in future systems without significant cost.[31]

CHAPTER 5

FUTURE CAPABILITY

Introduction

OMFTS requires a rapid maneuver capability from ship-to-objectives and back. The goal is seamless maneuver from a sea base of operations that exploits the maneuverability available in the littorals. The idea is to exploit the avenues of approach and protection offered by the sea to pit strength against enemy weakness.[1] Sea basing combat support and combat service support is desired. Deployment of other than assaulting forces is minimized.

Maneuver warfare is ingrained throughout Marine Corps doctrine. However, the application of maneuver warfare to ship-to-shore movement is recent.[2] As demonstrated throughout history, forces controlling the sea have exploited the littorals for success inland. Today, the United States' dominance of the sea presents opportunities for unchallenged littoral maneuver. The application of maneuver warfare to ship-to-objective maneuver is relevant and necessary regardless of technology. Technology only enhances the ability to execute the maneuver and support the principles of OMFTS. The OMFTS principles are: focusing against a strategic objective; using the sea as maneuver space; generating overwhelming tempo; pitting strength against weakness; and emphasizing intelligence, deception, and flexibility.

Resulting from these recent changes, functional concepts for ship-to-objective maneuver and amphibious power projection are in development. These concepts explore a wide range of ideas and equipment to improve ship-to-objective maneuver. OMFTS provides the first well-documented change to concepts for amphibious operations. Moreover, this concept is intended to live, evolve, and provide a framework for exploring and building future capability.[3] Conceptually, the capabilities outlined in OMFTS will never be fully satisfied, but will drive technology toward improving capability.

Although present ship-to-objective maneuver capabilities are not sufficient for a large seamless maneuver from the sea, limited operations can occur. Assuming the command and control, fire support, intelligence, and mobility enhancements are available in the future, the Marine Corps of the future still needs a plan of action to enhance ship-to-objective maneuver and push limits of the OMFTS concept.

Planned Tactical Mobility Assets Supporting OMFTS

The approach currently planned and programmed by the Marine Corps is to modernize equipment and develop a triad of ship-to-objective maneuver capabilities. In conjunction with equipment modernization tactics and techniques are changing. The planned approach improves surface tactical mobility with the fielding of the AAAV and continuation of the LCAC program. The mobility triad is completed with fielding of the V-22 and maintenance of the CH-53E heavy lift helicopter. Moreover, all combat development follows guidelines of deployability and versatility.[4]

AAAV and V-22 will provide tactical mobility for ground maneuver (infantry) forces. The LCAC will provide tactical mobility for the MAGTF's heavier assets that can not fit aboard the V-22 or AAAV. These assets include LAVs for recon security, tanks, artillery, heavy antitank in HMMW-V, and CSS. Critical to maneuvering combined arms forces seamlessly from sea to objective are AAAV, V-22, and LCAC availability.[5] Understanding how well programs fulfill the goals of OMFTS requires an understanding of capability and employment.

AAAV

Title 10, U.S. Code directs the Marine Corps to develop equipment used by landing forces in amphibious operations. The AAAV is the number one ground weapon system program in the Marine Corps and the only Acquisition Category (ACAT) 1 program sponsored by the Marine Corps. The AAAV will provide expeditionary forces with the water and land mobility, firepower, survivability, and lift to execute the OMFTS concept. The AAAV will be the Marine Corps primary means of accomplishing surface power projection and, if necessary, forcible entry against any level of defended littoral. It will provide the principal means of armor-protected mobility and direct-fire support to Marine infantry during operations ashore to include a Nuclear, Biological, or Chemical (NBC) environment.

The AAAV is designed to complement the LCAC and V-22 in significantly improving the amphibious lift and tactical mobility of Marine forces. The increased speed and range of the AAAV contributes to the survivability of the Amphibious Task Force and permits a

significantly faster buildup rate of combat forces ashore. AAAV range will be between sixty-five and seventy-five nautical miles at a water speeds of twenty to twenty-five nautical miles per hour.

The AAAV capabilities will include: an inherent amphibious capability; at a minimum, three times the water speed of the current AAV7A1 without appliqué armor, twenty-five knots sustained speed; the ability to defeat future threat light armored vehicles frontally at ranges of, at least, 1500 meters while on the move and under conditions of darkness and adverse weather; significantly greater cross country mobility and speed than the current AAV7A1 to permit operations with the main battle tank; and the carrying capacity for a reinforced Marine rifle squad of seventeen Marines or an equivalent of 2,210 kilograms of cargo.

The AAAV will also operate in riverine environments with equal effectiveness. A twenty-five millimeter chain gun will provide the main armament for the AAAV. Additionally, a thirty caliber machine gun will be coaxial mounted. Turret design will facilitate addition of two Javelin antitank missile (extended range) launch rails and upgrade capability to a minimum thirty millimeter chain gun.[6]

LCAC

In the future the LCAC becomes the workhorse, if not the singular landing craft, for ship-to-objective maneuver. No other landing craft possesses the range or speed necessary to operate in the flexible maneuver-based style. The LCAC is capable of ship-to-shore maneuver on over 85 percent of the world's coastline, four times more

than other landing craft. The limitation for LCAC remains limited numbers available to an amphibious force and its survivability.

The future amphibious fleet will be comprised of twelve Amphibious Ready Groups (ARGs), structured around one "big deck" LHA or LHD, one LSD, and one LPD. Each ARG would be capable of embarking seven-to-nine LCACs. A notional twelve ship amphibious group would embark approximately thirty-two LCACs. A notional twenty-four ship amphibious task force could embark approximately sixty-four LCACs and carry an amphibious force similar to that employed during Desert Storm.[7] The AAAV Supplemental Analysis of May 1995 was conducted to validate solutions and requirements for surface maneuver from the sea. The analysis plan included a notional amphibious task force of twenty-seven ships including fifty-four LCACs.[8]

The LCAC survivability has been a concern. Its survivability comes from its speed and maneuverability, however, the LCAC has no protection from indirect or direct fires. The Center for Naval Analysis study conducted in 1988 stated that adding five tons of armor would reduce vulnerability. However, adding armor to the present configuration reduces its carrying capacity below what is required for an M1A1 tank and effects the overall load mix for other systems.[9]

V-22 (OSPREY)

The V-22 is the Marine Corps replacement for the aging CH-46E and CH-53D medium lift assault force. The V-22 is a tilt-rotor aircraft capable of carrying twenty-four combat equipped Marines or a 10,000 pound external load. Cruising at 250 knots with worldwide

self-deployability (2,100 nautical miles with one in-flight refueling), the V-22 will enhance rapid response and force closure. The V-22 will be the cornerstone of the Corps assault support force in the twenty-first century. It will provide the Marine Air Ground Task Force with an assault support aircraft possessing the speed, endurance, combat radius, payload, and survivability needed to fight and win on tomorrow's battlefield. The combination of speed, payload, combat radius, and survivability provide the capabilities needed to enhance maneuver warfare, minimize casualties, and maintain the technological and operational edge well into the twenty-first century.[10]

Meeting the Requirement for Ship-to-objective Maneuver

The mobility triad of AAAV, LCAC, and V-22 have undergone extensive modeling and analysis during the program development of the AAAV and V-22. The projected capabilities of both systems were portrayed in a common notional scenario involving two Marine Expeditionary Forces (MEF), one ashore and one afloat. The MEF ashore attacks from the south while the afloat MEF lands north of the enemy to encircle and neutralize enemy forces between the two MEFs. In this scenario, regimental sized vertical assaults are conducted by both MEFs to: 1) remove artillery threats to the littoral penetration zone (MEF ashore); 2) establish blocking positions supporting the surface assault and preventing enemy quick response to the surface assault (MEF afloat); 3) establish an artillery battalion fire base to support the surface assault (MEF ashore). The MEF (afloat) as part of a Naval Expeditionary Force (NEF) conducts a regimental surface assault with an infantry

regiment, tank battalion, Light Armored Reconnaissance Battalion (LAVs), and an artillery regiment as the main surface assault components. A fleet of twenty-seven future amphibious ships and an embarked fifty-four LCACs support the NEF. The vertical assaults from the MEF (afloat) occur when NEF is fifty nautical miles offshore. The surface assault is planned to occur when the NEF is twenty-five nautical miles from shore.

The surface assault is planned for a night assault across two littoral penetration zones to rapidly seize an inland objective. The assault force employs an AAAV Battalion and fifty-four LCACs. The AAAV battalion had a total of 153 operational AAAV personnel carriers and ten AAAV command and control variants. This combination was able to move assault forces ashore within five hours. Moreover, the assault force only initially required 118 LCAC sorties to lift in assaulting forces. However, in evaluating these LCAC sorties it is apparent that 118 sorties only lift combat forces. There is no logistics, or combat support other than artillery built into these sorties. Sustaining and properly supporting this force requires further LCAC support.[11] Providing minimal LCAC losses and depending on the threat situation this could be accomplished. However, once again the assault force must maintain security of the line of communication for a longer duration. This scenario demonstrates that the increased capability provides for a rapid buildup of combat power and increased flexibility. The mission was accomplished within twenty-one hours or one-half of the time required by a force lacking the AAAV. The combat power buildup when employing the AAAV, LCAC, and V-22 was 42 percent faster than with a force equipped with the AAV. The mission was not even executable

without the LCAC and V-22. However, the survivability of LCAC was raised as an issue during the evaluations.[12]

A notional force of nine to twelve amphibious ships is used by Marine Corps planners in discussing an immediate response to a crisis. A future mix of twelve amphibious ships could deploy with approximately thirty-two LCACs and a company of AAAVs for surface ship-to-objective maneuver. The AAAV company would provide mobility for one infantry battalion. The V-22 and CH53E helicopters would provide an air assault capability for another infantry battalion and lift for some combat support and combat service support inland to support the overall campaign. The LCACs would provide lift for the infantry battalions heavy machine-guns, TOW or Javelin anti-tank weapons, mortars, and command and control; a company of LAVs; a company of tanks; and an artillery battery. Breaching assets, logistics, additional command and control, electronic warfare platforms are other systems that would be evaluated for early maneuver by LCACs. After the first wave, LCACs are required to return to ships located over the horizon and reload, refuel, and assault back to shore. With no additional amphibious assets our logistics is tied to LCAC loads. The complexity is further compounded if the area of operations includes unfordable rivers and inland obstacles. LCACs are then required to bring the necessary bridging and breaching equipment ashore early in the operation. Overall LCAC turn-around time will still limit the ability to rapidly maneuver inland.[13]

Another possibility is with a deployed Marine Expeditionary Unit (MEU), which is based around a three ship Amphibious Ready Group (ARG).

Given a future ship mix the amphibious forces would have seven to nine LCACs and approximately twelve AAAVs. A sampling of the MEU's forces potentially includes an artillery battery, air defense (Avengers), command and control assets, part of an LAR Company, armored HMMWVs with TOW anti-tank and heavy machine-guns, a tank platoon, and combat service support. Without developing the landing plan in detail, it is obvious that landing this force will require several lifts by the LCACs. Depending on mission requirements, a seamless maneuver from over the horizon may not be possible. Moreover, the ability to rapidly transition between maneuver at sea and land maneuver and fully exploiting littorals is tied to limited LCAC sorties.

Other Proposed Concepts

Several other concepts for achieving the ship-to-objective maneuver capabilities exist. A few divergent ideas are presented to provide a representation of ideas for the future.

Family of AAAV

A possible solution is development of a family of amphibious vehicles based on one chassis, the AAAV. A family of amphibious vehicles provides a self deploying combined arms force that uses the sea as a maneuver corridor. This family of vehicles would expand the current AAAV fleet beyond personnel carriers and command and control. The AAAV family would replace the current LAV with a smaller reconnaissance variant and the tank and TOW system with a tank or antitank variant of the AAAV. Development of a howitzer or turreted 120mm mortar variant would provide mobile close and direct fire support

in addition to NSFS, aviation, and future smart technology enhancements. Additionally, an engineer variant could incorporate future detection and breaching technologies with sea and land mobility. Finally, a logistic variant could provide immediate logistic functions to the assault force. Figure 1 provides a notional breakdown of a family of AAAV.

	ACTIVE	RESERVE	PREPOSITION	SUSTAINMENT (INC: MAINT. FLOAT, SCHOOLS)	TOTAL
PERSONNEL	2 BNS W/4 COS 36 PER CO/4 @ BN TOTAL = 256	1 BN W/4 COS 6 PER CO/2@BN TOTAL = 26	38 PER MPSRON TOTAL = 114	TOTAL = 65	461
C2	30	2	12	8	52
ENGINEER	10	2	6	6	24
FIRES	2 BNS OF 18 TOTAL = 36	6	18	18	78
RECON	2 BNS W/4 COS 11 PER CO/4 @ BN TOTAL = 96	1 BN W/4 COS 6 PER CO 2 @ BN TOTAL = 26	33	45	200
TANK/ ANTITANK	2 BNS W/4 COS 11 PER CO/4 @ BN TOTAL = 96	1 BN W/4 COS 6 PER CO 2 @ BN TOTAL = 26	33	45	200
LOGISTICS	144	12	36	40	232
MAINT	36	12	9	20	75
					TOTAL=1322

Figure 1. Proposed notional breakdown of AAAV Family.

The basis of opposition to this concept is cost. During interviews of senior Marine Corps officials fiscal constraints were the largest limitation to improvement of capability. When asked whether they saw a need for a family of amphibious vehicles, the consensus was that increased capability was needed. However, that capability could come from throughout the MAGTF. Specifically, improvements in engineer capabilities, fires, and antitank assets were mentioned. However, each person interviewed concurred that cost is a restriction.[14] However, when the same question was asked to students at the Army Command and

General Staff College the consensus felt the capability was essential. The difference can be explained by senior level experience with Marine Corps' limited procurement budgets.

Given the approximate five million dollar per vehicle cost of the AAAV this concern is not easily dismissed. Although a cost study is not within the scope of this study the concern must be addressed. Initially, the idea was that the assessment should not be constrained by cost. However, the concern was so great that a limited explanation of system costs is included. The following costs represent approximate procurement costs for systems relevant to this assessment in today's dollars. Replacement of an AAV with the AAAV is estimated at $5 million per AAAV; replacement of the M1A1 tank with the M1A2 is about $5.4 million for conversion of an existing M1 tank; LAV-25 cost is approximately $1.8 million for today's system which incorporates 1980s technology; LAV (AT) is $2.4 million, LAV turreted 120mm mortar is $3.3 million; a projected cost for a future LAV with upgraded technology for command and control, situational awareness, survivability, and lethality is not available. The LW155 howitzer, a lighter and more maneuverable howitzer, is projected to cost $1.2 million per howitzer; and the Combat Breacher Vehicle, a vehicle designed to reduce and breach obstacles is projected to cost $5 million per system. Additionally, the U.S. Army's Armored Gun System (AGS) has a projected cost of around $3 million dollars for a light armor package with additional survivability increasing the cost.

The ages of the respective Marine Corps systems are: AAV is twenty-five years; LAV is thirteen years; and Marine Corps M1A1 Common

tank is four years. The AAV currently is planned for replacement by the AAAV beginning in the year 2004; the LAV should begin replacement around the year 2012, as it will be thirty years old at that time; the tank should be maintainable until 2020, however, its weight and size are a concern for future mobility; and the TOW is anticipated to be replaced around the year 2010. Regardless of what system is procured, replacement of current and future capability is expensive.[15]

The procurement of a family of amphibious vehicles could not occur simultaneously. Procurement of a family of amphibious vehicles should be designed to coincide with replace existing systems at the end of their current service life. Under this plan, procurement of the AAAV family would extend until the year 2020 maximizing existing systems' service life, research and development endeavors, and budget constraints.

There are multiple benefits to a program of this nature. First of all, Marine Corps development would include not only amphibious systems, but systems which match our deployment capabilities. Development of systems that are not easily embarked and deployed from amphibious shipping does not enhance Marine Corps capabilities in responding to worldwide crises. Although maritime prepositioning has provided near term assistance to increase response capabilities, this compromise system lacks the characteristics required by an expeditionary force. Concepts that evolve prepositioning to a floating sea base still require a ship-to-objective maneuver capability. Ship-to-objective maneuver is necessary regardless of the enemy situation.

The amphibious family benefits are apparent whether involved in a WW II or in a Somalia operation. Additionally, the amphibious family supports the concept of using the sea for subsequent maneuver once ashore. Relying on landing craft to support subsequent maneuver from land, through the sea, to inland objectives would be difficult and time critical. Moreover, the amphibious vehicle is rarely restricted by inland waterways, rivers, and tactical bridging limitations. A capability demonstrated during WW II in Europe and a deep concern now with limited bridges and infrastructure limitations.[16]

Second, the cost is mitigated when a single base system is developed. Development costs are limited by focusing on a common system. Moreover, training, supply, and maintenance is enhanced by supporting a single base system. Rather than the Marine Corps relying on other service training, supply, maintenance, and support, these vehicles would be centrally managed and tailored to support amphibious power projection capabilities.

Third, the Marine Corps' developmental focus should center on deployability. Involvement in programs like a Combat Breacher Vehicle that weighs 70 tons or a ribbon bridge that is difficult to embark aboard either MPS or amphibious ships should not occur. The Marine Corps is chartered to develop amphibious capabilities. These capabilities must match the expeditionary nature of the force.

Finally, opportunities to reduce cost may be possible with limitations of speed, size, and over-the-horizon capability. The development of the family should consider deployability, as well as other complementary assets within the MAGTF. The MAGTF capability must

other complementary assets within the MAGTF. The MAGTF capability must be assessed in total to determine which capabilities are essential in the family of amphibious vehicles.

Under a family of vehicles concept the AAAV requirement would be redesigned to accommodate procurement of the family. Currently, the AAAV requirement is approximately 1013 vehicles. The AAAV requirement fills approximately nine-ten companies of active structure with personnel variants and command and control variants. An additional two companies of vehicles per MPSRON and supporting establishment vehicles fulfill the 1013 vehicle requirement. Given limitations in amphibious lift and a need to project a combined arms force ashore, a requirement incorporating multiple capabilities beyond the personnel carrier and command and control variant would increase overall capability. The example described in Figure 1. includes a family of 1,300 vehicle platforms. Potential variants could include a tank or antitank variant, a fire support variant such as the 120mm turreted mortar, an engineer and breacher variant, an electronic and information warfare variant, a logistics variant, and a maintenance variant. Each potential system adopted into an amphibious family improves the littoral maneuver capability of the Marine Corps and frees LCACs to support other systems. Moreover, this family of systems must closely match force structure and employment plans to avoid excess requirements.

Infestation Concepts

The concept of infestation is being explored as a complementary technique in amphibious operations. Infestation is a concept whereby

small teams utilize stealthful maneuver to infest an enemy's rear area. In this concept, small teams are inserted in advance and during the amphibious assault to reduce the enemy's ability to react and divert forces from opposing the assault. These teams are provided with sophisticated communications and targeting equipment, allowing them to engage the enemy with precision munitions delivered from naval or air platforms. Their targets are enemy lines of communication, command and control, logistics, and other key targets and formations. Engaging the enemy's rear area and lines of communications shapes the battlefield to support maneuver ashore.

The use of infestation forces can reduce the amount of forces required in the traditional ship-to-shore or objective maneuver. The infesting forces work to reduce enemy forces and improve combat ratios for the assault.

Conceptually, infestation forces could accomplish missions traditionally requiring much larger forces. The infesting forces require the long range flexible maneuver inherent in the mobility triad of the AAAV, LCAC, and V-22. However, these forces would generally be smaller and lighter and could be inserted at different times. Therefore these forces are easier to support with smaller quantities of ship-to-objective lift.[17] Development of this technique could reduce the quantity of heavy forces required to assault, thereby, reducing requirements for ship-to-objective maneuver.

Complementary to infestation is a technique described as investation. In this technique, forces maneuvering from a seabase penetrate the beach at multiple points avoiding enemy contact. Once

ashore, these forces seize key objectives and attack the enemy with precision munitions.[18] The force avoids contact with large enemy formations until sufficient combat power and sustainment can maneuver ashore. The penetrations can occur at different times allowing the mission to be accomplished with less lift.

Infestation and investation are dependent on advanced battlefield awareness and a proliferation of precision munitions. These forces are susceptible to direct ground attack. However, these techniques are promising complements and have an additional benefit of reducing required lift.

Family of LAV

A less expensive alternative to amphibious capabilities is the development of a family of light armored vehicles to fulfill missions other than personnel carriers. The current LAV family includes a reconnaissance and security variant, an anti-tank variant, a mortar variant, a command and control variant, an air defense variant, a logistics variant, and a maintenance variant. Improvement of the LAV family should be less expensive. However, the vehicle currently employs old technology and presently requires extensive modernization. Additionally, requirements for situational awareness, survivability, and modernization could put the cost of a LAV family near an AAAV family. Moreover, the LAV is not surf capable and requires LCAC to move it from the sea base to shore and for subsequent maneuver through the sea. Continuing development in the LAV does not improve capabilities to

project power ashore and maneuver through the sea. Currently, no program or accurate cost estimate exists for a future LAV.

Conclusion

The planned enhancements will do much to meet the goals of OMFTS.[19] However, they are not the final and absolute answer. The mobility of AAAV, LCAC, and V-22 provide seamless maneuver capability for most of the assault echelons. However, depending on the mission and requirements for combat support or combat service support the operation becomes more tenuous. A problem remains in ship-to-objective maneuver. Multiple trips of LCACs are required to bring assault forces ashore. Moreover, without combat support and combat service support immediately available, the assault forces capability for immediate maneuver inland is limited. Finally, subsequent maneuver from land through the sea to other inland objectives is reliant upon shipping and LCAC availability.

Current joint warfighting agreements include U.S. Army assets supporting the U.S. Marine Corps. Examples of these systems include armor, rockets, and general support artillery. Other examples could be heavy engineering, bridging, and breaching assets. Multiple Rocket Launcher Systems, breaching equipment, such as the Combat Breacher Vehicle (CBV), and Army M1A1 Tanks which have no surf or fording capability all require dry landings from landing craft. All of these systems add additional burdens to strained LCAC employment either in the assault or as a follow-on force. The limitations of U.S. Army systems which are not amphibious and do not have fording capability further complicate maneuver ashore in immature theaters lacking adequate bridges and infrastructure.

The Marine Corps has only one active duty bridge company and plans to deploy only ribbon bridge raft sets as assault bridging with MPSRONs. These limited assets restrict the forces ability to cross inland waterways or operate in flooded areas. Limitations such as these certainly restrict an expeditionary forces capabilities that has limited amphibious capability.

Each asset the Marine Corps owns that is not amphibious or air transportable complicates our deployment problems. Moreover, these systems detract from providing an expeditionary force for crisis response. Finally, they fail to contribute to combined arms forces capable of seamless maneuver through and from the sea.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Resource competition within the Department of Defense has an impact on achieving desired warfighting capability. Fiscal constraints make development of some useful capability unaffordable.[1] Service competition for resources continues, however, previously the nature of war allowed time to develop capabilities. The current world situation requires immediate crisis response with a capable force to prevent war. Moreover, available weapons of mass destruction, lethality of conventional forces, and the realization that a potential adversary may not allow a slow buildup of combat power as in Desert Storm increase the need for a "come as you are" force. Regardless of the resources, supporting an immediate response with credible forces is a critical capability.

Ensuring ship-to-objective maneuver capability is a Marine Corps responsibility.' This capability is not the sole province of Marine forces, but is intended to include the projection of joint forces from the sea. Moreover, there are only two ways to project forces onto foreign soil, from the air and from the sea. The Marine Corps concerns itself with projecting power from a sea base under expeditionary conditions and includes air employment. In benign threat situations, air and sea deployment are combined to maximize force buildup. However,

there is concern over reliance on limited foreign infrastructures, ports, and airfields. Maritime prepositioning programs have provided improved capabilities, particularly when welcomed onto friendly shores with a developed infrastructure. However, it is when friendly ports are not available or an enemy can interdict port operations that problems occur. This study looks at the need to maneuver from the sea and into an undeveloped infrastructure or against an unfriendly shore.

Assessment

This thesis assessed development of ship-to-objective surface tactical mobility, current capability, deficiencies related to OMFTS, planned enhancements to current capability, and recommendations for improvements. The over-arching concern was whether the Marine Corps' surface tactical mobility requirements for ship-to-objective maneuver support the Naval operational concept of OMFTS? The final assessment is that present programs will not fulfill the goals of OMFTS. However, the current Marine Corps program, including the AAAV, V-22, and LCAC along with amphibious ship enhancements is a major improvement in capabilities needed for ship-to-objective maneuver. The principal remaining deficiency is a lack of capability to maneuver flexibly with a combined arms force. This deficiency includes a lack of capability to flexibly maneuver sustainment ashore, and a lack of capability to flexibly maneuver the combined arms force from the shore, back through the sea to subsequent inland objectives.

History

How was maneuver from the sea conducted in the past? Throughout history, amphibious operations illustrated the need for the capabilities described in OMFTS. A constant throughout history has been the advantage gained by maneuver at sea. Moreover, it is imperative that the force assaulting from the sea be a combined arms force that can rapidly transition to inland maneuver. Limitations on amphibious forces have been the ability to provide heavier supporting forces and sustainment. Rapid transition from the sea to land and back to sea again is a clear advantage for the assaulting force. The use of aviation is a significant enhancement. However, lift limitations require a surface lift capability to maneuver heavier assets such as engineer, artillery, tanks and anti-tank weapons, command and control and logistics.

Why OMFTS?

What factors contributed to the development of OMFTS? The worldwide instabilities and protection of national interest demand a power projection capability.[2] Moreover, a shift from global to regional threats resulted in reassessment of the Naval Service's priorities. This reassessment led to the formulation of the "From the Sea" and OMFTS concepts. These concepts placed a renewed emphasis on littoral operations. U.S. Navy dominance of the sea allows unchallenged maneuver at sea. OMFTS counters improved enemy situational awareness and modern weapon lethality by exploiting the sea as maneuver space, maintaining flexibility in the operation, and increasing tempo and range of

operations. Finally, technology breakthroughs support significant enhancements to power projection capabilities.[3]

Current Capability

What are the surface tactical mobility assets available for OMFTS? The AAV, LCAC, and landing craft such as the LCU provide surface mobility. Helicopters are an important complement to surface mobility and are instrumental in maneuvering ground combat power ashore.

Do they support the concept of OMFTS? Current assets provide some capability. Only a small part of the assault force is flexible enough to fulfill OMFTS goals. The LCAC and helicopter are the only assets with the speed and range necessary to assault from over the horizon or to maneuver through the sea. However, the numbers of LCAC available to the amphibious force, the LCAC's survivability, and its size remain concerns and limitations. Additionally, present day helicopters lack the lift and speed for survivable maneuver with external or heavy internal loads. The limited speeds of the AAV and landing craft restrict them to shorter maneuver and neither provide the flexibility to maneuver at sea.[4]

However, the principles of OMFTS: focusing against a strategic objective; using the sea as maneuver space; generating overwhelming tempo; pitting strength against weakness; and emphasizing intelligence, deception, and flexibility can still guide the operations. OMFTS does more than define requirements for future equipment, it also extends maneuver warfare to the sea, and provides doctrine and training guidance.

> As a concept, OMFTS is relevant regardless of current technology, because advances only enhance the ability to execute maneuver warfare which is at the heart of OMFTS.[5]

Planned Capability

What are the planned surface tactical mobility assets supporting OMFTS? The AAAV, V-22, and LCAC form the mobility triad supporting the concept. Additionally, several other concepts and ideas are being explored within the Marine Corps. However, presently they are not a part of the Marine Corps program. Moreover, the greatest concern for providing the required capability is cost and limited resources.

Do planned surface tactical mobility assets meet the requirements for seamless ship-to-objective maneuver, as described in OMFTS? The mobility triad is a vast capability improvement in ship-to-objective maneuver and facilitates the flexible maneuver required by OMFTS. However, limitations in LCAC quantity and helicopter lift capacities do not support flexible maneuver of heavier warfighting assets, combat support, and combat service support. Moreover, LCAC size and survivability remain a concern for the future.

Additional Required Capabilities

What additional capabilities are needed to support OMFTS? The additional capabilities required are the capability to maneuver from and through the sea with a combined arms force, to maneuver combat support, and to maneuver combat service support. Moreover, a rapid transition back and forth from land to sea maneuver is required for maneuvering to subsequent inland objectives.

Several technology improvements were discussed in Chapter 5. One option was an AAAV family that includes vehicle variants to provide a combined arms force with necessary combat support and combat service support. The AAAV platform is the basis for the family, but size, speed, protection, and firepower would vary based on required capability. Another idea is a family of LAVs. This option, although not as capable, may cost less. However, the current LAV is 1980's technology, has limited survivability, requires redesign to ensure growth capacity, and requires support of two combat vehicles systems. Moreover, additional LAVs within the assault force increases LCAC requirements for quantity available, survivability, and size.

A tactical approach to improving capability may include increased use of infestation tactics. This approach uses small teams with improved communications, target acquisition, and lethal fires to disrupt an enemy's lines of communication, command and control, and destroy key targets to assist the maneuver from the sea and reduce the need for heavier systems. This tactic could be independent of a larger operation, but more often it is tied to a maneuver from the sea.

Conclusion

There is a void in the capability to maneuver from and through the sea in the present and future. Limited quantities of LCAC may not provide the seamless transition of heavier assets required by OMFTS. High tech fire support and logistics of the future, if developed, will alleviate some of the problem, but a synergistic combined arms force maneuvering on the ground remains a requirement. Moreover, LCACs and

amphibious shipping are necessary for deployment of follow-on forces and sustainment and may not be available for subsequent maneuver of the initial assault force.

Current plans provide the AAAV and V-22 to lift infantry forces, but lack the combined arms capabilities necessary to fight and win against a mechanized or heavily supported infantry threat as the force moves inland. Additional surface maneuver capabilities are required to realize the potential of flexible and seamless maneuver from a seabase. Moreover, subsequent maneuver from land through the sea to subsequent inland objectives is a desire of OMFTS and Marine Corps leadership.[6] Without increased surface maneuver capabilities that desire will remain unfulfilled.

Why has the envisioned capability been limited? The most probable answer is cost. Declining Department of Defense resources and keen competition for various service programs complicate the problem. The emphasis on power projection and crisis response in the National Military Strategy is recent and all of the military services are attempting to redefine their place in this strategy.

Power projection and crisis response has always been a Marine Corps focus. Moreover, even when this nation was involved heavily in the nuclear deterrent strategy of the Cold War, military theorists insisted that our defense strategy maintain a balance. The capability to respond to conventional threats throughout the spectrum of conflict was necessary to support security.[7] The vision of the 82d Congress in building a Marine Corps, as articulated in Title 10,

> Such a force, versatile, fast-moving, and hard hitting, will constantly have a very powerful impact in relation to minor international disturbances. Such a force can prevent the growth of potentially large conflagrations by prompt and vigorous action during their incipient stages . . . to provide a balanced force in readiness for a naval campaign and at the same time, a ground and air striking force ready to suppress or contain international disturbances short of large scale war.[8]

The need for amphibious operations has not changed. Protection of worldwide interests requires a capability to project power across a hostile shore. It is crucial that the Marine Corps ensure the capability is there. The current program is a great start, but current and programmed capability does not adequately fulfill power projection needs. Surface ship-to-objective maneuver requires additional enhancement.

Recommendations

It is strongly recommended that the U.S. Marine Corps review developmental programs to ensure their compatibility with future ship-to-objective maneuver platforms, amphibious ships, and MPSRONs. Ensuring the amphibious and expeditionary nature of Marine Forces should be a primary combat development principle. The force must be designed for maneuver from the sea. Moreover, requirements for AAAVs, LCACs, and V-22 should link to a projected required capability and force structure.

Maritime Prepositioned Forces (MPF) may not solve our future problems. The program is complicated, expensive, and limited to benign threat areas with an infrastructure. An assessment of future MPF capabilities vice investment in expeditionary capabilities is recommended.

Cost concern over a family of AAAV is warranted, but may not be insurmountable. The program for a family of AAAV should be developed to coincide with other current systems' end of service life. Replacing systems over time will distribute procurement cost and maximize existing capability. The benefits of such a program are: (1) provides direction to combat development; (2) reinforces and enhances proven concepts (building block approach); (3) control of combat development by the Marine Corps; (4) replaces cumbersome heavy equipment and weapons; and (5) reduces maintenance, logistics, and training costs by using a common system. As the AAAV program matures, exploration of this concept could prove beneficial.

LCAC upgrade is another area that can improve ship-to-objective maneuver significantly. The LCAC provides a critical capability for maneuvering heavier warfighting assets, combat support, and combat service support. Moreover, LCACs may provide the only tactical mobility for follow on U.S. Army forces. Increasing available LCACs and improving survivability are two areas vital to improving power projection capability. The fielding of the present LCAC dramatically improved capability, further enhancement will magnify this effect. The LCAC program should be evaluated to improve future capability.

A new LAV family for the future is a viable concept. Highly maneuverable LAVs are easily embarked aboard ship. The small size and weight of an LAV optimize LCAC employment. Cost comparison between an AAAV family and a LAV family and LCAC improvement should be conducted. However, without a truly amphibious vehicle assault forces are

restricted by the sea and their ability to coordinate with LCACs and shipping.

Suggestions For Further Research

A cost study assessing development of a family of amphibious platforms should be conducted. This program may be more efficient than separate LAV, antitank, tank, heavy truck, and fire support initiatives.

Assess the future assault force organization to determine composition of the future infantry battalion, tanks, engineers, and artillery. An assessment of this nature could be instrumental in defining further requirements for ship-to-objective maneuver.

Conclusion

Further study of both ship-to-objective maneuver capability and force organization would be useful in defining future requirements. Critical to the final answer is developing a future base force that provides credible forces for amphibious assault, sustained combat operations ashore, and those other manpower intensive expeditionary operations such as humanitarian assistance, peacekeeping, and peace enforcement. Moreover, understanding the role that smart munitions and infestation forces will play in the future is essential. Gaining an understanding of the future force will facilitate specific definition of ship-to-objective maneuver requirements.

ENDNOTES

Chapter 1

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APPENDIX A

INTERVIEW FOR SENIOR MARINE CORPS OFFICIALS

The purpose of this letter is to conduct an interview by correspondence. I intend to use the results in developing a Master's of Military Arts and Sciences thesis. I am a student at the U. S. Army Command and General Staff College, Fort Leavenworth, Kansas. My primary research question for my thesis is, "Do Marine Corps' surface tactical mobility requirements for ship-to-objective maneuver support the Naval operational concept of Operational Maneuver from the Sea (OMFTS)?". My goal is to present an argument for increasing ship-to-objective tactical mobility capabilities.

My research will look at the evolution of ship-to-shore movement. Amphibious operations conducted by Julius Caesar in Britain and throughout history demonstrated the need for combined arms forces that rapidly transition from the sea to land. During W.W.II we developed a wide array of amphibious ships and landing craft providing a capability for U. S. power projection. Included in this capability were LVTs armed with everything from 155mm to machine guns. This development continued under the influences of W.W.II and Korea. However, since the fielding of the current AAV in the 1970s, development of amphibious warfare capabilities has slowed. A preoccupation with the Soviet threat, the helicopter role in amphibious operations, and fiscal constraints are contributing reasons to slowed development. Moreover,

during this period the Marine Corps followed the Army lead into projects like the LAV, M1A1 Tank, and M198 howitzer. These are arguably some of the best weapons systems in the world, but they were not designed with amphibious operations in mind.

Worldwide instabilities have once again focused war-fighters on a need to project power. Providing for this need has brought about prepositioning programs as well as a renewed focus on amphibious capability. The general decline of ports and infrastructures worldwide make the use of prepositioned ships and commercial or military sealift an unreliable option. The need for the Nation's amphibious capability has never been greater. Recent operations in Somalia highlighted the problems of reliance on port facilities. Moreover, continued reliance on ports invites disaster. Consider that ports are in built up areas, escalating the potential for having to fight in an urban area. The concept of Operational Maneuver From the Sea (OMFTS) explains the need for amphibious capabilities well. However, is there enough tactical mobility for ship-to-objective maneuver? OMFTS professes that the mobility triad of AAAV, MV-22, and LCAC will support our needs.

The AAAV and MV-22 provide lift and maneuver of infantry battalions. Only, LCAC remains to support rapid movement of our additional warfighting assets. Both history and OMFTS emphasize the need for combined arms amphibious forces that make a seamless transition from seaward to landward maneuver. There is a void in this capability. Limited quantities of LCAC may not provide the seamless transition of LAV, heavy anti-tank (TOW or its replacement), tank, combat support, and combat service support required by OMFTS. High tech fire support and

logistics of the future will alleviate some of the problem, but we will also require a synergistic combined arms force maneuvering on the ground. The AAAV and MV-22 will lift infantry forces, but lack the combined arms capabilities necessary to fight and win against a mechanized or heavily supported infantry threat as we move inland.

A possible solution would be development of a family of amphibious vehicles based on one chassis, the AAAV. A family of amphibious vehicles provides a self deploying combined arms force that uses the sea as a maneuver corridor. This family of vehicles would replace our current LAV and tank with a reconnaissance and tank variant of the AAAV. Additionally, we would plan for a howitzer or turreted 120mm mortar variant for close fire support in addition to NSFS, aviation, and future smart technologies. Finally, a logistic variant would complete the family of vehicles. The benefits would include ease of amphibious employment, logistics, training, and Marine Corps developmental control.

Developing a family of vehicles will be a considerable expense. Given the problems in funding the AAAV, developmental and procurement costs for this family appear prohibitive. However, several factors mitigate these costs. First, each variant of the family of vehicles would be a planned end of service replacement for our current combat vehicles. For example, the LAV replacement should occur around 2010, tank replacement immediately following, and so on. Second, development of one vehicle with multiple variants and functions maximizes research and development efforts. Third, common parts, maintenance, and training provide long term efficiencies. Finally, a focused modernization plan

based on OMFTS directs the Marine Corps toward an endstate. The endstate provides the goal. Cost only effects the timing and specific requirements for the solution.

I believe that the need for amphibious operations has not changed. The common thread throughout history is that if you want to be a world influence you have to project power across a hostile shore. The limiting factor on a Nation's capability to accomplish that task has been the ability to rapidly transition credible combined arms forces before an enemy intervenes. Although there may be many ways to accomplish this task, the most essential is from the sea. I hope this project assists in defining future requirements for the Marine Corps. To support this thesis and form credible conclusions, I request that the General provide input to assist this project. Several questions are enclosed next under for comment.

Interview Worksheet

1. What factors contributed to the development of OMFTS?

2. Do planned tactical mobility programs meet the requirements for seamless maneuver from ship-to-objective as described in OMFTS? (Y/N)

3. Is there a need for additional mobility beyond the mobility triad of AAAV, MV-22, and LCAC? (Y/N)

4. Do you see a requirement for a family of amphibious vehicles? (Y/N)

   a. If no, why?

   b. If yes, what capabilities would you desire in such a family? (circle capabilities desired)

Fire support
Reconnaissance
Tank/Anti-tank
Engineer
Logistics
C2
EW
Other_____

   c. Would the family all require similar capabilities such as high speed ship-to-objective capability?

5. Given that OMFTS intends to open the sea for maneuver, does that include subsequent maneuver from shore through the sea to subsequent objectives? For example: Maneuvering around an enemy or obstacle through the sea to strike a deep objective. (Y/N)

Comments:

APPENDIX B

INTERVIEW FOR MARINES STUDENTS AT THE U.S. ARMY COMMAND AND GENERAL STAFF COLLEGE, FORT LEAVENWORTH, KANSAS

1. Do current ship-to-shore maneuver capabilities meet Marine Corps needs for amphibious assaults?

Do current ship-to-shore maneuver capabilities meet Marine Corps needs for amphibious assaults as described in OMFTS? (Y/N)

3. Is there a need for additional mobility beyond the mobility triad of AAAV, MV-22, and LCAC in the future? (Y/N)

4. Do you see a requirement for a family of amphibious vehicles? (Y/N)

a. If no, why?

b. If yes, what capabilities would you desire in such a family? (circle capabilities desired)
Fire support
Reconnaissance
Tank/Anti-tank
Engineer
Logistics
C2
EW
Other_____

c. Would the family all require similar capabilities such as high speed ship-to-objective capability?

5. Given that OMFTS intends to open the sea for maneuver, does that include subsequent maneuver from shore through the sea to subsequent objectives? For example: Maneuvering around an enemy or obstacle through the sea to strike a deep objective. (Y/N)

Comments:

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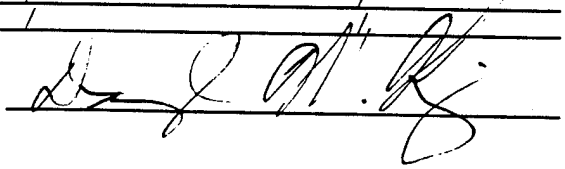

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